NO SHOP

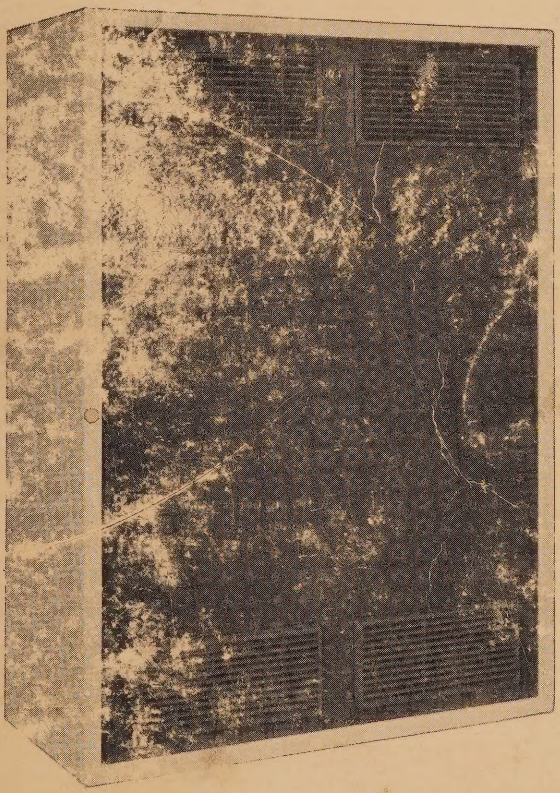
MOTOROLA

FOR RING BI
REMOVE STA

"MICOR"®
"COMPA-STATION"®
Base Radio
Remote Control

132-174 MHz

68P81013E65- K



THIS INSTRUCTION MANUAL MUST BE USED WITH "CONTROL AND APPLICATIONS" INSTRUCTION MANUAL 68P81025E60

MOTOROLA INC.

instruction manual revision

general

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

instruction manual affected:

Service, Owner's, and Operator's manuals for Mobile, Base Station, Marine, and Microwave and Rural Telephone RF Equipment

revision details:

The new OSHA safety information provided below supersedes any similar information already included in the instruction manual. File this manual revision directly under the front cover of the manual.

GENERAL SAFETY INFORMATION

The United States Department of Labor, through the provisions of the Occupational Safety and Health Act of 1970 (OSHA), has established an electromagnetic energy safety standard which applies to the use of this equipment. Proper use of this radio will result in exposure below the OSHA limit. The following precautions are recommended:

> DO NOT operate the transmitter of a mobile radio when someone outside the vehicle is within two feet (0.6 meter) of the antenna.
>
> DO NOT operate the transmitter of a fixed radio (base station, microwave, and rural telephone rf equipment) or marine radio when someone is within two feet (0.6 meter) of the antenna.
>
> DO NOT operate the transmitter of any radio unless all RF connectors are secure and any open connectors are properly terminated.

In addition,

> DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.
>
> All equipment must be properly grounded according to Motorola installation instructions for safe operation.
>
> All equipment should be serviced only by a qualified technician.

Refer to the appropriate section of the product service manual for additional pertinent safety information.

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NATIONAL ACCOUNTS PARTS DEPT.
1313 E. Algonquin Road
Schaumburg, Illinois 60196

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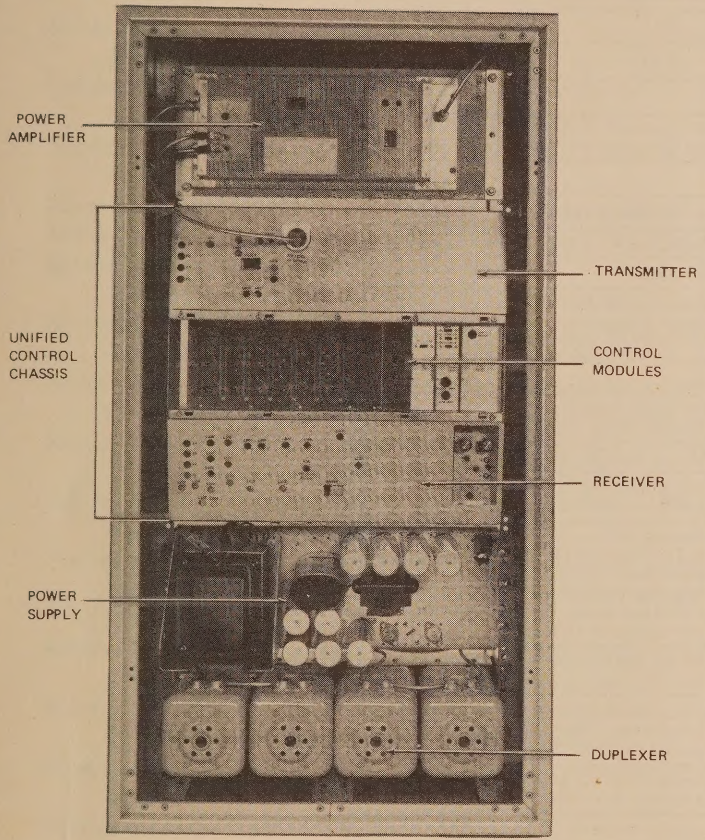
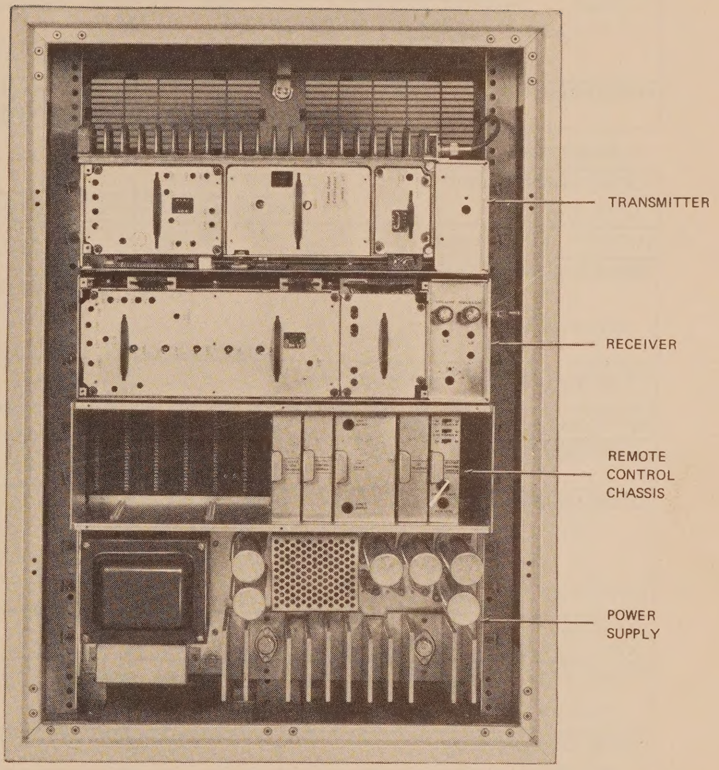
"MICOR" "COMPA-STATION" BASE & REPEATER RADIO

132-174 MHz
60, 90, 100 & 110 W RF POWER


POWER AMPLIFIER
TRANSMITTER
UNIFIED CONTROL CHASSIS
CONTROL MODULES
RECEIVER
POWER SUPPLY
DUPLEXER

FAEPS–23238–O
(P–368)

Typical Continuous Duty Station


TRANSMITTER
RECEIVER
REMOTE CONTROL CHASSIS
POWER SUPPLY

FAEPS–24209–O
(H106)

Typical Intermittent Duty Station

MOTOROLA INC.
Communications Division

service publications
1301 E. Algonquin Road, Schaumburg, IL 60196

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Printed in U.S.A.

68P81013E65-K
2/24/78-UP

SPECIFICATIONS

GENERAL

MODEL SERIES			C53RCB, C53RTB	C63RCB, C63RTB	C73RCB, C73RTB
RF POWER OUTPUT (WATTS)			60	90	RCB = 100 RTB = 110
120V AC (+20%, -40%), 60 Hz INPUT POWER REQUIREMENTS (WATTS)			120	180	200
INPUT AC CURRENT REQUIREMENTS (AMPS)	STANDBY		0.63		
	TRANSMIT		3.15	4.4	5.46
FREQUENCY RANGE (MHz)			150.8-174.0	132-174	
NO. OF FREQUENCIES			Up to 4 frequencies		
CABINET DIMENSIONS (INCHES)	INDOOR CABINET (RTB MODELS ONLY)		22 wide x 30-1/4 high x 10 deep		
	INDOOR CABINET (RCB MODELS ONLY)		22 wide x 41 high x 10 deep		
	OUTDOOR CABINET		22 wide x 46 high x 20 deep		
APPROX. SHIPPING WEIGHT (LBS)	INDOOR REMOTE CONTROL	RCB MODELS	190		
		RTB MODELS	150		
	OUTDOOR REMOTE CONTROL	RCB MODELS	180		
		RTB MODELS	130		
METERING			Optional internal mounted meter used to measure all essential circuits for tuning and checking.		

TRANSMITTER

RF POWER OUTPUT	RTB MODELS	60W, 90W, 110W
	RCB MODELS	60W, 90W, 100W
OUTPUT IMPEDANCE		50 ohms
OSCILLATOR FREQUENCY STABILITY		Channel element maintains oscillator frequency within 0.0005% (±0.0002% optional) from -30°C to +60°C ambient (+25°C reference)
TRANSMITTER SIDE BAND NOISE		90 dB @ ±30kHz 105 dB @ ±1 MHz
SPURIOUS & HARMONICS		More than 85 dB below carrier
MODULATION		15F2 and 16F3: ±5 kHz for 100% at 1000 Hz
AUDIO SENSITIVITY		Local: 0.165 volt ±3dB for 60% maximum deviation at 1000 Hz. Remote Telephone Line: -20 dBm max. for 60% maximum deviation at 1000 Hz
FM NOISE		55 dB below 60% system deviation at 1000 Hz
AUDIO RESPONSE		+1, -3 dB from 6 dB/octave pre-emphasis, 300-3000 Hz, referenced to 1000 Hz
AUDIO DISTORTION		Less than 2% at 1000 Hz; 60% system deviation

RECEIVER

		WITHOUT PREAMPL	WITH PREAMPL
CHANNEL SPACING		30 kHz	
EIA MODULATION ACCEPTANCE		±7 kHz, minimum	
OSCILLATOR FREQUENCY STABILITY		Channel element maintains oscillator frequency within ±0.0005% from -30°C to +60°C ambient (+25°C reference) ±0.0002% AFC (optional)	
INPUT IMPEDANCE		50 ohms	
SENSITIVITY	20 dB QUIETING	Less than 0.5 uV	Less than 0.25 uV
	EIA SINAD	Less than 0.35 uV	Less than 0.175 uV
SELECTIVITY (EIA SINAD)		-100 dB at ±30 kHz	-95 dB at ±30 kHz
INTERMODULATION (EIA SINAD)		-80 dB	-75 dB
SPURIOUS & IMAGE REFLECTION		100 dB, minimum/90 dB (2-Receiver Stations Only)	95 dB, minimum/ 85 dB (2-Receiver Stations Only)
SQUELCH SENSITIVITY	CARRIER SQUELCH (ADJUSTABLE)	0.20 uV or less at threshold	0.10 uV or less at threshold
	TONE-CODED SQUELCH (FIXED)	0.20 uV or less	0.10 uV or less
AUDIO (TELEPHONE LINE)	OUTPUT	+18 dBm at 600 ohms	
	RESPONSE	+1, -3 dB	
	DISTORTION	3% at 1000 Hz	
	HUM & NOISE	-55 dB	
	LOCAL SPEAKER	10 watts at 8 ohms output available	

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SAFETY INFORMATION

The United States Department of Labor, through the provisions of the Occupational Safety and Health Act of 1970 (OSHA), has established an electromagnetic radiation safety standard which applies to this equipment. Normal use of this radio will result in exposures far below the OSHA limit. However, the following precautions are recommended:

DO NOT approach the antenna closer than four inches for omni-directional antennas or four feet for all other antennas when the transmitter is operative.

DO NOT operate the transmitter unless all rf connectors are secure and any open connectors are properly terminated with a leakproof load.

FOREWORD

1. SCOPE OF MANUAL

This manual is intended for use by experienced technicians familiar with similar types of equipment. It contains all service information required for the equipment described and is current as of the printing date. Changes which occur after the printing date are incorporated by Instruction Manual Revisions (SMR). These SMR's are added to the manuals as the engineering changes are incorporated into the equipment.

2. MODEL AND KIT IDENTIFICATION

Motorola equipments are specifically identified by an overall model number on the nameplate. In most cases, assemblies and kits which make up the equipment also have kit model numbers stamped on them. When a production or engineering change is incorporated, revision suffix numerals are added to the affected kit model number. For example, a TLN4448A becomes a TLN4448A-1 with the first revision, TLN4448A-2 with the second revision, etc.

As diagrams are updated, information about the change is incorporated into a revision column. This revision column appears in the manual next to the parts list or, in some cases, on the diagram. It lists the reference number, part number, and description of the parts removed or replaced when the suffix number changed. With this information, the technician can find the information for the current version, and any previous version, of the equipment covered by the manual.

3. SERVICE

Motorola's National Service Organization offers one of the finest nation-wide installation and maintenance programs available to communication equipment users. This organization includes approximately 800 authorized Motorola Service Stations (MSS) located throughout the United States, each manned by one or more trained, FCC licensed technicians.

These MSS's are independently owned and operated and were selected by Motorola to service its customers. Motorola maintenance is available on either a time and material basis or on a periodic fixed-fee type arrangement.

The administrative staff of this organization consists of national, area and district service managers and district representatives, all of whom are Motorola employees with the objective to improve the service to our customers.

Should you wish to purchase a service contract for your Motorola equipment, contact your Motorola Service Representative, or write to:

National Service Manager
Motorola Communications Division
1303 E. Algonquin Road
Schaumburg, Illinois 60196

4. REPLACEMENT PARTS ORDERING

Motorola maintains a number of parts offices strategically-located throughout the United States. These facilities are staffed to process parts orders, identify part numbers, and otherwise assist in the maintenance and repair of Motorola Communications Division products.

Orders for all parts *except* crystals, active filters, code plugs, channel elements, and "Vibrasender" ® and "Vibrasponder" ® resonant reeds should be sent to the nearest area parts center. Orders for instruction manuals should also be sent to the area parts center.

When ordering replacement parts or equipment information, the complete identification number should be included. This applies to all components, kits, and chassis. If the component part number is not known, the order should include the number of the chassis or kit of which it is a part, and sufficient description of the desired component to identify it.

Orders for crystals, channel elements, active filters, code plugs, and reeds should be sent directly to the factory address listed on the following page. Crystal and channel element orders should specify the crystal or channel element type number, crystal and carrier frequency, and the chassis model number in which the part is used.

Orders for active filters, code plugs, "Vibrasender" and "Vibrasponder" resonant reeds should specify type number and frequency, and should identify the owner/operator of the communications system in which these items are to be used.

5. ADDRESSES

5.1 GENERAL OFFICES

MOTOROLA, INC.
Communications Group Parts Dept.
1313 E. Algonquin Rd.,
Schaumburg, Illinois 60196
Phone: 312-576-6521
Executive Offices: 1303 E. Algonquin Rd.,
Schaumburg, Illinois 60196

5.2 U.S. ORDERS

WESTERN AREA PARTS
1170 Chess Drive, Foster City,
San Mateo, California 94404
Phone: 415-349-3111
TWX: 910-375-3877

MIDWEST AREA PARTS
10 W. North Ave.,
Lombard, Ill. 60148
Phone: 312-620-3000
TWX: 910-693-1592

MID-ATLANTIC AREA PARTS
6701 Elkridge Landing Road,
Linthicum, Maryland 21090
Phone: 301-796-8600

EAST CENTRAL AREA PARTS
12995 Snow Road,
Parma, Ohio 44130
Phone: 216-267-2210
TWX: 810-421-8845

EASTERN AREA PARTS
85 Harristown Road,
Glen Rock, New Jersey 07452
Phone: 201-447-4000
TWX: 710-988-5602

PACIFIC SOUTHWESTERN AREA PARTS
2333 Utah Avenue,
El Segundo, California 90245
Phone: 213-644-1101
TWX: 910-348-6278

SOUTHWESTERN AREA PARTS
3320 Belt Line Road,
Dallas, Texas 75234
Phone: 214-241-2151
TWX: 910-860-5505

SOUTHEASTERN AREA PARTS
5096 Panola
Industrial Blvd.
Decatur, Georgia 30032
Phone: 504-981-9800
TWX: 810-751-8300

5.3 CANADIAN ORDERS

CANADIAN MOTOROLA ELECTRONICS COMPANY
Parts Department
3125 Steeles Avenue, East M2H 2H6
Willowdale, Ontario
Phone: 416-499-1441
TWX: 610-492-2713
Telex: 065-25191

5.4 ALL COUNTRIES EXCEPT U.S. AND CANADA

MOTOROLA, INC. OR MOTOROLA AMERICAS, INC.
International Parts Dept.
1313 E. Algonquin Road
Schaumburg, Illinois 60196 U.S.A.
Phone: 312-576-6492
TWX: 910-693-1592 or 1599
Telex: 722443 or 722424
Cable: MOTOL

5.5 FACTORY ADDRESS FOR CRYSTAL, CHANNEL ELEMENT, ACTIVE FILTER, CODE PLUGS AND RESONANT REED ORDERS

AIR MAIL ORDERS
Motorola, Inc.
Component Products Sales & Service
P.O. Box 66191
O'Hare International Airport
Chicago, Ill. 60666

REGULAR MAIL ORDERS AND CORRESPONDENCE
Motorola, Inc.
Component Products Sales & Service
2553 N. Edgington Street
Franklin Park, Illinois 60131

RTB "D" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
BASE STATIONS-INTERMITTENT DUTY
CARRIER SQUELCH AND "PRIVATE-LINE" TONE-CODED SQUELCH
132-174 MHz

CODE:

- X = ONE ITEM SUPPLIED
- 2 = TWO ITEMS SUPPLIED
- O = TWO K1005A RCVR ELEMENTS SUPPLIED UNLESS RECEIVER CARRIER FREQS. ARE SEPARATED BY 11.7 MHz ±30 kHz (OR A SUB-MULTIPLE THEREOF). IN THIS CASE A K1005A CHANNEL ELEMENT IS USED IN FIRST

RECEIVER SHIFTED IF)

R

R

5. ADDRESSES

5.1 GENERAL OFFICES

MOTOROLA, INC.
Communications Group Parts Dept.
1313 E. Algonquin Rd.,
Schaumburg, Illinois 60196
Phone: 312-576-6521
Executive Offices: 1303 E. Algonquin Rd.,
Schaumburg, Illinois 60196

5.2 U.S. ORDERS

WESTERN AREA PARTS
1170 Chess Drive, Foster City,
San Mateo, California 94404
Phone: 415-349-3111
TWX: 910-375-3877

MIDWEST AREA PARTS
10 W. North Ave.,
Lombard, Ill. 60148
Phone: 312-620-3000
TWX: 910-693-1592

MID-ATLANTIC AREA PARTS
6701 Elkridge Landing Road,
Linthicum, Maryland 21090
Phone: 301-796-8600

EAST CENTRAL AREA PARTS
12995 Snow Road,
Parma, Ohio 44130
Phone: 216-267-2210
TWX: 810-421-8845

EASTERN AREA PARTS
85 Harristown Road,
Glen Rock, New Jersey 07452
Phone: 201-447-4000
TWX: 710-988-5602

PACIFIC SOUTHWESTERN AREA PARTS
2333 Utah Avenue,
El Segundo, California 90245
Phone: 213-644-1101
TWX: 910-348-6278

SOUTHWESTERN AREA PARTS
3320 Belt Line Road,
Dallas, Texas 75234
Phone: 214-241-2151
TWX: 910-860-5505

SOUTHEASTERN AREA PARTS
5096 Panola
Industrial Blvd.
Decatur, Georgia 30032
Phone: 504-981-9800
TWX: 810-751-8300

5.3 CANADIAN ORDERS

CANADIAN MOTOROLA ELECTRONICS COMPANY
Parts Department
3125 Steeles Avenue, East M2H 2H6
Willowdale, Ontario
Phone: 416-499-1441
TWX: 610-492-2713
Telex: 065-25191

5.4 ALL COUNTRIES EXCEPT U.S. AND CANADA

MOTOROLA, INC. OR MOTOROLA AMERICAS, INC.
International Parts Dept.
1313 E. Algonquin Road
Schaumburg, Illinois 60196 U.S.A.
Phone: 312-576-6492
TWX: 910-693-1592 or 1599
Telex: 722443 or 722424
Cable: MOTOL

5.5 FACTORY ADDRESS FOR CRYSTAL, CHANNEL ELEMENT, ACTIVE FILTER, CODE PLUGS AND RESONANT REED ORDERS

AIR MAIL ORDERS
Motorola, Inc.
Component Products Sales & Service
P.O. Box 66191
O'Hare International Airport
Chicago, Ill. 60666

REGULAR MAIL ORDERS AND CORRESPONDENCE
Motorola, Inc.
Component Products Sales & Service
2553 N. Edgington Street
Franklin Park, Illinois 60131

RTB "D" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
BASE STATIONS-INTERMITTENT DUTY
CARRIER SQUELCH AND "PRIVATE-LINE" TONE-CODED SQUELCH
132-174 MHz

CODE:

X · ONE ITEM SUPPLIED

2 = TWO ITEMS SUPPLIED

O = TWO K1005A RCVR ELEMENTS SUPPLIED UNLESS RECEIVER CARRIER FREQS. ARE SEPARATED BY 11.7 MHz ±30 kHz (OR A SUB-MULTIPLE THEREOF). IN THIS CASE A K1005A CHANNEL ELEMENT IS USED IN FIRST ~~RECEIVER AND A KXN1022A CHANNEL ELEMENT IS USED IN SECOND RE-~~ CEIVER. THE IF OF THE SECOND RECEIVER IS SHIFTED.

* · INDICATES A SERIES OF MODELS. SPECIFIC MODEL DEPENDS UPON CARRIER FREQUENCY.

STATION MODEL VARIABLES

NOTE
STATION MODELS ARE NOT AVAIABLE FOR ALL POSSIBLE LETTER AND NUMBER COMBINATIONS.

C53RTB-1105D

5 = DC REMOTE CONTROL
6 = TONE REMOTE CONTROL

0 = T1-R1
1 = T2-R1
2 = T2-R2
4 = T2-2R (2 RECEIVERS)

1 = CARRIER SQUELCH
3 · "PRIVATE-LINE" TONE-CODED SQUELCH

5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 - 110 W RF OUTPUT

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	T1 = ONE XMIT FREQ. T2 = TWO XMIT FREQS. R1 = ONE RCVR FREQ. R2 = TWO RCVR FREQS. 2R = TWO RCVRS-ONE FREQ. EACH	CONTROL TYPE	FCC LICENSE DESIGN.	DESCRIPTION MODEL	TRANSMITTER POWER AMPLIFIER, 60-WATT *TLD2160A	POWER AMPLIFIER, 110-WATT *TLD2150A	EXCITER-FILTER (132-174 MHz) *TLD2060A	POWER CONTROL BOARD (60-WATT) TLD8610AV	POWER CONTROL BOARD (90/110-WATT) TLD8620AV	CHANNEL ELEMENT, TRANSMITTER KXN1019B	RECEIVER RF & IF BOARD, RECEIVER *TLD8270B	AUDIO POWER AMPLIFIER, RECEIVER TLN4290B	AUDIO & SQUELCH BOARD TRN6006A	SECOND RECEIVER TLN1865A	SHIFTED IF KIT TLD8740A	2-RECEIVER COUPLER TLN4758A	CHANNEL ELEMENT, RECEIVER K1005A	CHANNEL ELEMENT, RECEIVER (FOR 2ND RECEIVER SHIFTED IF) KXN1022A	MISCELLANEOUS SERVICE BOARD TLN8799A	ANTENNA SWITCH TLN4295A	CABINET, INDOOR (30") THN6141A	CABINET, INDOOR (41") THN6142A	POWER SUPPLY TPN1151A	HARMONIC FILTER (132-174 MHz) *TFD6100A	RF CABLE KIT, TRANSMITTER TKN6936A	RF CABLE, TRANSMITTER TKN6569A	PANEL ASSEMBLY, PA TRN6971A	HARDWARE KIT, 1-RECEIVER TRN6976A	HARDWARE KIT, "PL" DECODER TLN5654A	HARDWARE KIT, 2-RECEIVER TRN6977A	HARDWARE KIT, "PL" ENCODER TRN6188A	HARDWARE KIT, PA (132-174 MHz) *TLD2190A	"PRIVATE-LINE" "PL" ENCODER TLN5731A	"PL" DECODER TRN6002A	SENDER KLN6210A	"VIBRASPONDER" RESONANT REED TLN8381A	REMOTE CHASSIS UNIFIED CONTROL CHASSIS TCN1223A	GUARD TONE DECODER MODULE TLN1245B	C2-R2 TONE CONTROL MODULE TLN1245A	STATION CONTROL MODULE TLN4635B	F1-"PL" TONE CONTROL MODULE TLN4638A	F1 TONE CONTROL MODULE TLN4658A	F1-"PL" DC TRANSFER MODULE TLN4659A	F2-R2 MUTE DC TRANSFER MODULE TLN4660A	F1-CS DC TRANSFER MODULE TLN4661A	C2-R2 DC TRANSFER MODULE TLN4663A	F2 TONE CONTROL MODULE TLN4665A	LINE DRIVER MODULE/2-WIRE 1-RECEIVER TLN4669B	LINE DRIVER MODULE/2-WIRE 2-RECEIVER TLN4670B
C53RTB-1105D	60	CARRIER	T1-R1	DC	CC3181		X		X	X		X	X	X	X				X		X	X	X		X	X	X	X	X	X									X			X					X			X	
C53RTB-1106D	60	CARRIER	T1-R1	TONE	CC3181		X		X	X		X	X	X	X				X		X	X	X		X	X	X	X	X	X									X	X		X		X						X	
C53RTB-1115D	60	CARRIER	T2-R1	DC	CC3181		X		X	X		2	X	X	X				X		X	X	X		X	X	X	X	X	X									X			X				X				X	
C53RTB-1116D	60	CARRIER	T2-R1	TONE	CC3181		X		X	X		2	X	X	X				X		X	X	X		X	X	X	X	X	X									X	X		X		X					X	X	
C53RTB-1125D	60	CARRIER	T2-R2	DC	CC3181		X		X	X		2	X	X	X				2		X	X	X		X	X	X	X	X	X									X			X						X		X	
C53RTB-1126D	60	CARRIER	T2-R2	TONE	CC3181		X		X	X		2	X	X	X				2		X	X	X		X	X	X	X	X	X									X	X	X	X		X						X	
C53RTB-1145D	60	CARRIER	T2-2R	DC	CC3181		X		X	X		2	2	X	2	X	O	X	O	O	X	X		X	X	X	X	X	X			X							X			X				X					X
C53RTB-1146D	60	CARRIER	T2-2R	TONE	CC3181		X		X	X		2	2	X	2	X	O	X	O	O	X	X		X	X	X	X	X	X			X							X	X		X		X					X		X
C53RTB-3105D	60	"PL"	T1-R1	DC	CC3181		X		X	X		X	X	X	X				X		X	X	X		X	X	X	X	X	X	X		X		X	X	X	X	X			X								X	
C53RTB-3106D	60	"PL"	T1-R1	TONE	CC3181		X		X	X		X	X	X	X				X		X	X	X		X	X	X	X	X	X	X		X		X	X	X	X	X	X		X	X							X	
C53RTB-3115D	60	"PL"	T2-R1	DC	CC3181		X		X	X		2	X	X	X				X		X	X	X		X	X	X	X	X	X	X		X		X	X	X	X	X			X				X				X	
C53RTB-3116D	60	"PL"	T2-R1	TONE	CC3181		X		X	X		2	X	X	X				X		X	X	X		X	X	X	X	X	X	X		X		X	X	X	X	X	X		X	X				X		X	X	
C53RTB-3125D	60	"PL"	T2-R2	DC	CC3181		X		X	X		2	X	X	X				2		X	X	X		X	X	X	X	X	X	X		X		X	X	X	X	X			X						X		X	
C53RTB-3126D	60	"PL"	T2-R2	TONE	CC3181		X		X	X		2	X	X	X				2		X	X	X		X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X							X	
C53RTB-3145D	60	"PL"	T2-2R	DC	CC3181		X		X	X		2	2	X	2	X	O	X	O	O	X	X		X	X	X	X	X	X		2	X	X		X	2	X	2	X			X				X					X
C53RTB-3146D	60	"PL"	T2-2R	TONE	CC3181		X		X	X		2	2	X	2	X	O	X	O	O	X	X		X	X	X	X	X	X		2	X	X		X	2	X	2	X	X		X							X		X
C63RTB-1105D	90	CARRIER	T1-R1	DC	CC3182			X	X		X	X	X	X	X				X		X	X	X		X	X	X	X		X				X					X			X								X	
C63RTB-1106D	90	CARRIER	T1-R1	TONE	CC3182			X	X		X	X	X	X	X				X		X	X	X		X	X	X	X		X				X					X	X		X		X						X	
C63RTB-1115D	90	CARRIER	T2-R1	DC	CC3182			X	X		X	2	X	X	X				X		X	X	X		X	X	X	X		X				X					X			X				X				X	
C63RTB-1116D	90	CARRIER	T2-R1	TONE	CC3182			X	X		X	2	X	X	X				X		X	X	X		X	X	X	X		X				X					X	X		X		X					X	X	
C63RTB-1125D	90	CARRIER	T2-R2	DC	CC3182			X	X		X	2	X	X	X				2		X	X	X		X	X	X	X		X				X					X			X	X					X		X	
C63RTB-1126D	90	CARRIER	T2-R2	TONE	CC3182			X	X		X	2	X	X	X				2		X	X	X		X	X	X	X		X				X					X	X	X	X		X						X	
C63RTB-1145D	90	CARRIER	T2-2R	DC	CC3182			X	X		X	2	2	X	2	X	O	X	O	O	X	X		X	X	X	X	X				X		X					X			X	X			X					X
C63RTB-1146D	90	CARRIER	T2-2R	TONE	CC3182			X	X		X	2	2	X	2	X	O	X	O	O	X	X		X	X	X	X	X				X		X					X	X		X		X					X		
C63RTB-3105D	90	"PL"	T1-R1	DC	CC3182			X	X		X	X	X	X	X				X		X	X	X		X	X	X	X		X	X		X	X	X	X	X	X	X			X	X		X					X	X
C63RTB-3106D	90	"PL"	T1-R1	TONE	CC3182			X	X		X	X	X	X	X				X		X	X	X		X	X	X	X		X	X		X	X	X	X	X	X	X	X		X								X	
C63RTB-3115D	90	"PL"	T2-R1	DC	CC3182			X	X		X	2	X	X	X				X		X	X	X		X	X	X	X		X	X		X	X	X	X	X	X	X			X	X			X				X	
C63RTB-3116D	90	"PL"	T2-R1	TONE	CC3182			X	X		X	2	X	X	X				X		X	X	X		X	X	X	X		X	X		X	X	X	X	X	X	X	X		X					X		X	X	
C63RTB-3125D	90	"PL"	T2-R2	DC	CC3182			X	X		X	2	X	X	X				2		X	X	X		X	X	X	X		X	X		X	X	X	X	X	X	X			X						X		X	
C63RTB-3126D	90	"PL"	T2-R2	TONE	CC3182			X	X		X	2	X	X	X				2		X	X	X		X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X								X	
C63RTB-3145D	90	"PL"	T2-2R	DC	CC3182			X	X		X	2	2	X	2	X	O	X	O	O	X	X		X	X	X	X	X			2	X	X	X	X	2	X	2	X			X				X					
C63RTB-3146D	90	"PL"	T2-2R	TONE	CC3182			X	X		X	2	2	X	2	X	O	X	O	O	X	X		X	X	X	X	X			2	X	X	X	X	2	X	2	X	X		X							X		X
C73RTB-1105D	110	CARRIER	T1-R1	DC	CC3183			X	X		X	X	X	X	X				X		X	X	X		X	X	X	X		X				X					X			X								X	
C73RTB-1106D	110	CARRIER	T1-R1	TONE	CC3183			X	X		X	X	X	X	X				X		X	X	X		X	X	X	X		X				X					X	X		X		X						X	
C73RTB-1115D	110	CARRIER	T2-R1	DC	CC3183			X	X		X	2	X	X	2				X		X	X	X		X	X	X	X		X				X					X			X				X				X	
C73RTB-1116D	110	CARRIER	T2-R1	TONE	CC3183			X	X		X	2	X	X	X				X		X	X	X		X	X	X	X		X				X					X	X		X		X					X	X	
C73RTB-1125D	110	CARRIER	T2-R2	DC	CC3183			X	X		X	2	X	X	X				2		X	X	X		X	X	X	X		X				X					X			X						X		X	
C73RTB-1126D	110	CARRIER	T2-R2	TONE	CC3183			X	X		X	2	X	X	X				2		X	X	X		X	X	X	X		X				X					X	X	X	X		X						X	
C73RTB-1145D	110	CARRIER	T2-2R	DC	CC3183			X	X		X	2	2	X	2	X	O	X	O	O	X	X		X	X	X	X	X				X		X					X			X				X					X
C73RTB-1146D	110	CARRIER	T2-2R	TONE	CC3183			X	X		X	2	2	X	2	X	O	X	O	O	X	X		X	X	X	X	X				X		X					X	X		X		X					X		X
C73RTB-3105D	110	"PL"	T1-R1	DC	CC3183			X	X		X	X	X	X	X				X		X	X	X		X	X	X	X		X	X		X	X	X	X	X	X	X			X			X					X	
C73RTB-3106D	110	"PL"	T1-R1	TONE	CC3183			X	X		X	X	X	X	X				X		X	X	X		X	X	X	X		X	X		X	X	X	X	X	X	X	X		X	X							X	
C73RTB-3115D	110	"PL"	T2-R1	DC	CC3183			X	X		X	2	X	X	X				X		X	X	X		X	X	X	X		X	X		X	X	X	X	X	X	X			X				X				X	
C73RTB-3116D	110	"PL"	T2-R1	TONE	CC3183			X	X		X	2	X	X	X				X		X	X	X		X	X	X	X		X	X		X	X	X	X	X	X	X	X		X	X						X	X	
C73RTB-3125D	110	"PL"	T2-R2	DC	CC3183			X	X		X	2	X	X	X				2		X	X	X		X	X	X	X		X	X		X	X	X	X	X	X	X			X						X		X	
C73RTB-3126D	110	"PL"	T2-R2	TONE	CC3183			X	X		X	2	X	X	X				2		X	X	X		X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X							X	
C73RTB-3145D	110	"PL"	T2-2R	DC	CC3183			X	X		X	2	2	X	2	X	O	X	O	O	X	X		X	X	X	X	X			2	X	X	X	X	2	X	2	X			X				X					X
C73RTB-3146D	110	"PL"	T2-2R	TONE	CC3183			X	X		X	2	2	X	2	X	O	X	O	O	X	X		X	X	X	X	X			2	X	X	X	X	2	X	2	X	X		X	X						X		X

EPS-24284-A

																														THN6141A	CABINET, INDOOR (30")
						X	X							X	X							X	X							THN6142A	CABINET, INDOOR (41")
						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TPN1151A	POWER SUPPLY
						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	*TFD6100A	HARMONIC FILTER (132-174 MHz)
						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TKN6936A	RF CABLE KIT, TRANSMITTER
						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TKN6569A	RF CABLE KIT, TRANSMITTER
																						X	X	X	X	X	X	X	X	TRN6971A	PANEL ASSEMBLY, PA
								X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X	TRN6976A	HARDWARE KIT, 1-RECEIVER
						2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	TLN5654A	HARDWARE KIT, "PL" DECODER
						X	X							X	X							X	X							TRN6977A	HARDWARE KIT, 2-RECEIVER
						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TRN6188A	HARDWARE KIT, "PL" ENCODER
						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X									*TLD2190A	HARDWARE KIT, PA (132-174 MHz)
																															"DIGITAL PRIVATE-LINE"
						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TTN6003A	"DIGITAL PRIVATE-LINE" ENCODER
						2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	TLN5729A	"DIGITAL PRIVATE-LINE" DECODER
						2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	TRN6005A	CODE PLUG
																															REMOTE CONTROL
						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TCN1223A	UNIFIED CONTROL CHASSIS
						X		X		X		X		X		X		X		X		X		X		X		X		TLN1245B	GUARD TONE DECODER MODULE
								X								X								X						TLN1248A	C2-R2 TONE CONTROL MODULE
						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TLN4635B	STATION CONTROL MODULE
						X		X		X		X		X		X		X		X		X		X		X		X		TLN4638A	F1-"PL" TONE CONTROL MODULE
																														TLN4658A	F1 TONE CONTROL MODULE
													X								X								X	TLN4659A	F1-"PL" DC TRANSFER MODULE
							X				X				X				X				X				X			TLN4660A	F2-R2 MUTE DC TRANSFER MODULE
																														TLN4661A	F1-CS DC TRANSFER MODULE
									X								X								X					TLN4663A	C2-R2 DC TRANSFER MODULE
						X				X				X				X				X				X				TLN4665A	F2 TONE CONTROL MODULE
								X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X	TLN4669B	LINE DRIVER MODULE/2-WIRE 1-RECEIVER
						X	X							X	X							X	X							TLN4670B	LINE DRIVER MODULE/2-WIRE 2-RECEIVER

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																		X	X	X	X		X	X	X	X	X	X		TLN5729A	"DIGITAL PRIVATE-LINE" DECODER
																		2	2	2	X		2	2	2	2	2	2		TRN6005A	CODE PLUG
																														REMOTE CONTROL	
																		X	X	X	X		X	X	X	X	X	X		TCN1224A	UNIFIED CONTROL CHASSIS
																		X	X	X	X		X	X	X	X	X	X		TLN8799A	SERVICE BOARD
																		X	X	X	X		X	X	X	X	X	X		TLN4669B	LINE DRIVER MODULE 2-WIRE 1-RECEIVER
																		X	X	X	X		X	X	X	X	X	X		TLN4662A	SQUELCH GATE MODULE
																		X	X	X	X		X	X	X	X	X	X		TLN4635B	STATION CONTROL MODULE
																			X		X			X		X		X		TLN4659A	F1-"PL" DC TRANSFER MODULE
																		X		X			X		X		X			TLN4638A	F1-"PL" TONE CONTROL MODULE
																		X		X			X		X		X			TLN1245B	GUARD TONE DECODER MODULE
																		X	X	X	X		X	X	X	X	X	X		TLN4636A	TIME-OUT TIMER MODULE
																														DUPLEXER (T1487AF)	
																		4	4	4	4		4	4	4	4	4	4		TLD8392A	CAVITY FILTER
																		2	2	2	2		2	2	2	2	2	2		TKN6471A	RF CABLE
																		X	X	X	X		X	X	X	X	X	X		TKN6473A	RF CABLE
																		X	X	X	X		X	X	X	X	X	X		TKN6474A	RF CABLE
																		X	X	X	X		X	X	X	X	X	X		TLN4566A	HARDWARE KIT, MOUNTING (2 OR 4-CAVITIES)

EPS-24286-A

RTB "B" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
BASE STATIONS - INTERMITTENT DUTY
"DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH
132-174 MHz

CODE:

- ☒ - ONE ITEM SUPPLIED.
- 2 = TWO ITEMS SUPPLIED.
- O - TWO K1005A RCVR ELEMENTS SUPPLIED UNLESS RECEIVER CARRIER FREQS. ARE SEPARATED BY 11.7 MHz ±30 kHz (OR A SUB-MULTIPLE THEREOF). IN THIS CASE A K1005A CHANNEL ELEMENT IS USED IN FIRST RECEIVER AND A KXN1022A CHANNEL ELEMENT IS USED IN SECOND RECEIVER. THE IF OF THE SECOND RECEIVER IS SHIFTED.
- * - INDICATES A SERIES OF MODELS. SPECIFIC MODEL DEPENDS UPON CARRIER FREQUENCY.

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER AND NUMBER COMBINATIONS.

C53RTB-6105B

5 = DC REMOTE CONTROL
6 = TONE REMOTE CONTROL

0 = T1-R1
1 = T2-R1
2 = T2-R2
4 = T2-2R (2 RECEIVERS)

6 = "DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH

5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 = 110 W RF OUTPUT

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	T1 = ONE XMIT FREQ. T2 = TWO XMIT FREQS. R1 = ONE RCVR FREQ. R2 = TWO RCVR FREQS. 2R - TWO RCVRS - ONE FREQ. EACH	CONTROL TYPE	FCC LICENSE DESIGN.	DESCRIPTION	TRANSMITTER	POWER AMPLIFIER, 60-WATT	POWER AMPLIFIER, 110-WATT	EXCITER-FILTER (132-174 MHz)	POWER CONTROL BOARD (60-WATT)	POWER CONTROL BOARD (90/110-WATT)	CHANNEL ELEMENT, TRANSMITTER	RECEIVER	RF & IF BOARD, RECEIVER	AUDIO POWER AMPLIFIER, RECEIVER	AUDIO & SQUELCH BOARD	SECOND RECEIVER	SHIFTED IF KIT	2-RECEIVER COUPLER	CHANNEL ELEMENT, RECEIVER	CHANNEL ELEMENT, RECEIVER (FOR 2ND RECEIVER SHIFTED IF)	MISCELLANEOUS	SERVICE BOARD	ANTENNA SWITCH	CABINET, INDOOR (30")	CABINET, INDOOR (41")	POWER SUPPLY	HARMONIC FILTER (132-174 MHz)	RF CABLE KIT, TRANSMITTER	RF CABLE KIT, TRANSMITTER	PANEL ASSEMBLY, PA	HARDWARE KIT, 1-RECEIVER	HARDWARE KIT, "PL" DECODER	HARDWARE KIT, 2-RECEIVER	HARDWARE KIT, "PL" ENCODER	HARDWARE KIT, PA (132-174 MHz)	"DIGITAL PRIVATE-LINE"	"DIGITAL PRIVATE-LINE" ENCODER	"DIGITAL PRIVATE-LINE" DECODER	CODE PLUG	REMOTE CONTROL	UNIFIED CONTROL CHASSIS	GUARD TONE DECODER MODULE	C2-R2 TONE CONTROL MODULE	STATION CONTROL MODULE	F1-"PL" TONE CONTROL MODULE	F1 TONE CONTROL MODULE	F1-"PL" DC TRANSFER MODULE	F2-R2 MUTE DC TRANSFER MODULE	F1-CS DC TRANSFER MODULE	C2-R2 DC TRANSFER MODULE	F2 TONE CONTROL MODULE	LINE DRIVER MODULE/2-WIRE 1-RECEIVER	LINE DRIVER MODULE/2-WIRE 2-RECEIVER
						MODEL		*TLD2160A	*TLD2150A	*TLD2060A	TLD8610AV	TLD8620AV	KXN1019B		*TLD8270B	TLN4290B	TRN6006A	TLN1865A	TLD8740A	TLN4758A	K1005A	KXN1022A		TLN8799A	TLN4295A	TLN6111A	THN6142A	TPN1151A	*TFD6100A	TKN6936A	TKN6569A	TRN6971A	TRN6976A	TLN5654A	TRN6977A	TRN6188A	*TLD2190A		TTN6003A	TLN5729A	TRN6005A		TCN1223A	TLN1245B	TLN1248A	TLN4635B	TLN4638A	TLN4658A	TLN4659A	TLN4660A	TLN4661A	TLN4663A	TLN4665A	TLN4669B	TLN4670B
C53RTB-6105B	60	'DPL'	T1-R1	DC	CC3181			X		X	X		X		X	X	X				X			X	X	X		X	X	X	X	X	X	X		X			X	X	X		X			X			X					X	
C53RTB-6106B	60	DPL"	T1-R1	TONE	CC3181			X		X	X		X		X	X	X				X			X	X	X		X	X	X	X	X	X	X		X			X	X	X		X	X		X	X							X	
C53RTB-6115B	60	"DPL"	T2-R1	DC	CC3181			X		X	X		2		X	X	X				X			X	X	X		X	X	X	X	X	X	X		X			X	X	X		X			X				X				X	
C53RTB-6116B	60	"DPL"	T2-R1	TONE	CC3181			X		X	X		2		X	X	X				X			X	X	X		X	X	X	X	X	X	X		X			X	X	X		X	X		X	X						X	X	
C53RTB-6125B	60	"DPL"	T2-R2	DC	CC3181			X		X	X		2		X	X	X				2			X	X	X		X	X	X	X	X	X	X		X			X	X	X		X			X						X		X	
C53RTB-6126B	60	'DPL'	T2-R2	TONE	CC3181			X		X	X		2		X	X	X				2			X	X	X		X	X	X	X	X	X	X		X			X	X	X		X	X	X	X	X							X	
C53RTB-6145B	60	'DPL"	T2-2R	DC	CC3181			X		X	X		2		2	X	2	X	O	X	O	O		X	X		X	X	X	X	X	X		2	X	X			X	2	2		X			X				X					X
C53RTB-6146B	60	'DPL"	T2-2R	TONE	CC3181			X		X	X		2		2	X	2	X	O	X	O	O		X	X		X	X	X	X	X	X		2	X	X			X	2	2		X	X		X	X						X		X
C63RTB-6105B	90	'DPL'	T1-R1	DC	CC3182				X	X		X	X		X	X	X				X			X	X	X		X	X	X	X		X	X		X	X		X	X	X		X			X			X					X	
C63RTB-6106B	90	"DPL'	T1-R1	TONE	CC3182				X	X		X	X		X	X	X				X			X	X	X		X	X	X	X		X	X		X	X		X	X	X		X	X		X	X							X	
C63RTB-6115B	90	'DPL"	T2-R1	DC	CC3182				X	X		X	2		X	X	X				X			X	X	X		X	X	X	X		X	X		X	X		X	X	X		X			X				X				X	
C63RTB-6116B	90	'DPL"	T2-R1	TONE	CC3182				X	X		X	2		X	X	X				X			X	X	X		X	X	X	X		X	X		X	X		X	X	X		X	X		X	X						X	X	
C63RTB-6125B	90	"DPL"	T2-R2	DC	CC3182				X	X		X	2		X	X	X				2			X	X	X		X	X	X	X		X	X		X	X		X	X	X		X			X						X		X	
C63RTB-6126B	90	"DPL"	T2-R2	TONE	CC3182				X	X		X	2		X	X	X				2			X	X	X		X	X	X	X		X	X		X	X		X	X	X		X	X	X	X	X							X	
C63RTB-6145B	90	'DPL"	T2-2R	DC	CC3182				X	X		X	2		2	X	2	X	O	X	O	O		X	X		X	X	X	X	X			2	X	X	X		X	2	2		X			X				X					X
C63RTB-6146B	90	'DPL"	T2-2R	TONE	CC3182				X	X		X	2		2	X	2	X	O	X	O	O		X	X		X	X	X	X	X			2	X	X	X		X	2	2		X	X		X	X						X		X
C73RTB-6105B	110	"DPL"	T1-R1	DC	CC3183				X	X		X	X		X	X	X				X			X	X	X		X	X	X	X		X	X		X	X		X	X	X		X			X			X					X	
C73RTB-6106B	110	'DPL"	T1-R1	TONE	CC3183				X	X		X	X		X	X	X				X			X	X	X		X	X	X	X		X	X		X	X		X	X	X		X	X		X	X							X	
C73RTB-6115B	110	"DPL"	T2-R1	DC	CC3183				X	X		X	2		X	X	X				X			X	X	X		X	X	X	X		X	X		X	X		X	X	X		X			X				X				X	
C73RTB-6116B	110	'DPL"	T2-R1	TONE	CC3183				X	X		X	2		X	X	X				X			X	X	X		X	X	X	X		X	X		X	X		X	X	X		X	X		X	X						X	X	
C73RTB-6125B	110	"DPL"	T2-R2	DC	CC3183				X	X		X	2		X	X	X				2			X	X	X		X	X	X	X		X	X		X	X		X	X	X		X			X						X		X	
C73RTB-6126B	110	"DPL"	T2-R2	TONE	CC3183				X	X		X	2		X	X	X				2			X	X	X		X	X	X	X		X	X		X	X		X	X	X		X	X	X	X	X							X	
C73RTB-6145B	110	"DPL"	T2-2R	DC	CC3183				X	X		X	2		2	X	2	X	O	X	O	O		X	X		X	X	X	X	X			2	X	X	X		X	2	2		X			X				X					X
C73RTB-6146B	110	'DPL"	T2-2R	TONE	CC3183				X	X		X	2		2	X	2	X	O	X	O	O		X	X		X	X	X	X	X			2	X	X	X		X	2	2		X	X		X	X						X		X

EPS-24285-A

RCB "B" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
REPEATER (RT) STATIONS
CONTINUOUS & INTERMITTENT DUTY
"DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH
132-174 MHz

CODE:

X = ONE ITEM SUPPLIED

O = DUPLEXER UNIT SUPPLIED ONLY WHEN USED ABOVE 148 MHz AND TRANSMIT-RECEIVE FREQUENCIES ARE SEPARATED BY 1.5 MHz OR GREATER.

* = INDICATES A MODEL SERIES. SPECIFIC MODEL DEPENDS ON CARRIER FREQUENCY. (NOTE: 60-WATT STATIONS AVAILABLE ONLY FOR 150.8-174 MHz)

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER & NUMBER COMBINATIONS.

C53RCB-6105BT

5 = DC REMOTE CONTROL
6 - TONE REMOTE CONTROL

6 = "DIGITAL PRIVATE-LINE" SQUELCH

C = CONTINUOUS DUTY
T - INTERMITTENT DUTY

5 = 60 W RF OUTPUT
6 - 90 W RF OUTPUT
7 = 100 W RF OUTPUT WITH CONTINUOUS DUTY STATIONS
110 W RF OUTPUT WITH INTERMITTENT DUTY

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	CONTROL TYPE	FCC LICENSE DESIGNATION	TRANSMITTER								RECEIVER				
				DESCRIPTION	POWER AMPLIFIER, 60-WATT CONTINUOUS DUTY	POWER AMPLIFIER, 100-WATT CONTINUOUS DUTY	POWER AMPLIFIER, 110-WATT	POWER CONTROL BOARD (90/110-WATT)	EXCITER-FILTER	CHANNEL ELEMENT, TRANSMITTER	SHIELD, TRANSMITTER	SHIELD, TRANSMITTER	RF & IF BOARD, RECEIVER	AUDIO POWER AMPLIFIER, RECEIVER	AUDIO & SQUELCH BOARD	CHANNEL ELEMENT, RECEIVER	SHIELD, RECEIVER
				ITEM	*TLD1700C	*TLD1690C	*TLD2150A	TLD8620AV	*TLD2060A	KXN1019B	TLN5902A	TRN6974A	*TLD8270B	TLN4290B	TRN6006A	K1005A	TLN5903A
CONTINUOUS DUTY STATIONS																	
C53RCB-6105BT	60	"DPL"	DC	CC3185	X				X	X	X	X	X	X	X	X	X
C53RCB-6106BT	60	"DPL"	TONE	CC3185	X				X	X	X	X	X	X	X	X	X
C63RCB-6105BT	90	"DPL"	DC	CC3193		X			X	X	X	X	X	X	X	X	X
C63RCB-6106BT	90	"DPL"	TONE	CC3193		X			X	X	X	X	X	X	X	X	X
C73RCB-6105BT	100	"DPL"	DC	CC3184		X			X	X	X	X	X	X	X	X	X
C73RCB-6106BT	100	"DPL"	TONE	CC3184		X			X	X	X	X	X	X	X	X	X
INTERMITTENT DUTY STATIONS																	
C63RTB-6105BT	90	"DPL"	DC	CC3182			X	X	X	X		X	X	X	X	X	X
C63RTB-6106BT	90	"DPL"	TONE	CC3182			X	X	X	X		X	X	X	X	X	X
C73RTB-6105BT	110	"DPL"	DC	CC3183			X	X	X	X		X	X	X	X	X	X
C73RTB-6106BT	110	"DPL"	TONE	CC3183			X	X	X	X		X	X	X	X	X	X

STATION MODEL	MISCELLANEOUS													
DESCRIPTION	POWER SUPPLY	POWER SUPPLY	CABINET, INDOOR (41")	CABINET, INDOOR (30")	HARMONIC FILTER (132-174 MHz)	RF CABLE KIT	RF CABLE	CABLE KIT	RF CABLE KIT, TRANSMITTER	HARDWARE KIT	HARDWARE KIT, PA (132-174 MHz)	HARDWARE KIT, "PL" DECODER	HARDWARE KIT, "PL" ENCODER	HARDWARE KIT, 1-RECEIVER
ITEM	TPN1151A	TPN1110B	THN6142A	THN6141A	*TFD6100A	TKN6883A	TKN6581A	TKN6937A	TKN6569A	TLN5896A	*TLD2190A	TLN5654A	TRN6188A	TRN6976A
CONTINUOUS DUTY STATIONS														
C53RCB-6105BT		X	X			X	X			X		X	X	
C53RCB-6106BT		X	X			X	X			X		X	X	
C63RCB-6105BT		X	X			X	X			X		X	X	
C63RCB-6106BT		X	X			X	X			X		X	X	
C73RCB-6105BT		X	X			X	X			X		X	X	
C73RCB-6106BT		X	X			X	X			X		X	X	
INTERMITTENT DUTY STATIONS														
C63RTB-6105BT	X			X	X			X	X		X	X	X	X
C63RTB-6106BT	X			X	X			X	X		X	X	X	X
C73RTB-6105BT	X			X	X			X	X		X	X	X	X
C73RTB-6106BT	X			X	X			X	X		X	X	X	X

STATION MODEL	"DIGITAL PRIVATE-LINE"				REMOTE CONTROL									DUPLEXER (T1487AF)				
DESCRIPTION	"DIGITAL PRIVATE-LINE" ENCODER	"DIGITAL PRIVATE-LINE" ENCODER	"DIGITAL PRIVATE-LINE" DECODER	CODE PLUG	UNIFIED CONTROL CHASSIS	SERVICE BOARD	LINE DRIVER MODULE 2-WIRE 1-RECEIVER	SQUELCH GATE MODULE	STATION CONTROL MODULE	F1-"PL" DC TRANSFER MODULE	F1-"PL" TONE CONTROL MODULE	GUARD TONE DECODER MODULE	TIME-OUT TIMER MODULE	CAVITY FILTER	RF CABLE	RF CABLE	RF CABLE	HARDWARE KIT, MOUNTING (2 OR 4-CAVITIES)
ITEM	TTN6003A	TLN5725A	TLN5729A	TRN6005A	TCN1244A	TLN8799A	TLN4669B	TLN4662A	TLN4635B	TLN4659A	TLN4638A	TLN1245B	TLN4636A	TLD8392A	TKN6471A	TKN6473A	TKN6474A	TLN4566A
CONTINUOUS DUTY STATIONS																		
C53RCB-6105BT		X	X	2	X	X	X	X	X	X			X	4	2	X	X	X
C53RCB-6106BT		X	X	2	X	X	X	X	X		X	X	X	4	2	X	X	X
C63RCB-6105BT		X	X	2	X	X	X	X	X	X			X	4	2	X	X	X
C63RCB-6106BT		X	X	2	X	X	X	X	X		X	X	X	4	2	X	X	X
C73RCB-6105BT		X	X	2	X	X	X	X	X	X			X	4	2	X	X	X
C73RCB-6106BT		X	X	2	X	X	X	X	X		X	X	X	4	2	X	X	X
INTERMITTENT DUTY STATIONS																		
C63RTB-6105BT		X	X	X	X	X	X	X	X	X			X	4	2	X	X	X
C63RTB-6106BT		X	X	2	X	X	X	X	X		X	X	X	4	2	X	X	X
C73RTB-6105BT		X	X	2	X	X	X	X	X	X			X	4	2	X	X	X
C73RTB-6106BT		X	X	2	X	X	X	X	X		X	X	X	4	2	X	X	X

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																														ITEM	DESCRIPTION
																															TRANSMITTER
																									X	X	X	X		*TLD1700C	POWER AMPLIFIER, 60-WATT CONTINUOUS DUTY
																	X	X	X	X	X	X	X	X						*TLD1690C	POWER AMPLIFIER, 100-WATT CONTINUOUS DUTY
																	X	X			X	X			X	X				*TLD2060A	EXCITER-FILTER
																														TLN5902A	SHIELD, TRANSMITTER
																	X	X	X	X	X	X	X	X	X	X	X	X		KNX1019B	CHANNEL ELEMENT, TRANSMITTER
								X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		*TTD1690BA	TRANSMITTER, 90/110-WATT INTERMITTENT DUTY
								X	X	X	X	X	X	X	X																RECEIVER
																	X	X	X	X	X	X	X	X	X	X	X	X		*TLD8270B	RF & IF BOARD, RECEIVER
																	X	X	X	X	X	X	X	X	X	X	X	X		TRN6006A	AUDIO & SQUELCH BOARD
																	X	X	X	X	X	X	X	X	X	X	X	X		TLN4290B	AUDIO POWER AMPLIFIER, RECEIVER
								X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		K1005A	CHANNEL ELEMENT, RECEIVER
								X	X	X	X	X	X	X	X										X					TLN1435B	SHIELD AND FILTER, RECEIVER
																	X	X			X	X			X	X				TLN5654A	HARDWARE KIT, "PL" DECODER
																	X	X	X	X	X	X	X	X	X	X	X	X		TLN5903A	SHIELD, RECEIVER
																															MISCELLANEOUS
								X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		TPN1110B	POWER SUPPLY
																	X	X	X	X	X	X	X	X	X	X	X	X		TKN6581A	RF CABLE
																	X	X	X	X	X	X	X	X	X	X	X	X		TKN6883A	RF CABLE KIT
																	X	X	X	X	X	X	X	X	X	X	X	X		TLN5896A	HARDWARE KIT
								X	X	X	X	X	X	X	X															TKN6616A	STATION INTERCABLING (INTERMITTENT DUTY STATIONS)
								X	X	X	X	X	X	X	X															TLN4859A	HARDWARE, CABINET (INTERMITTENT DUTY STATIONS)
																	X	X	X	X	X	X	X	X	X	X	X	X		THN6142A	CABINET (CONTINUOUS DUTY STATIONS)
								X	X	X	X	X	X	X	X															THN6141A	CABINET (INTERMITTENT DUTY STATIONS)
																															"PRIVATE-LINE"
								X	X			X	X					X	X			X	X			X	X				TLN5731A	"PL" ENCODER
								X	X			X	X					X	X			X	X			X	X				TRN6002A	"PL" DECODER
								X	X			X	X					X	X			X	X			X	X				TLN6824A	"VIBRASENDER" RESONANT REED
								X	X			X	X					X	X			X	X			X	X				TLN8381A	"VIBRASPONDER" RESONANT REED
																	X	X			X	X			X	X				TLN6210A	SENDER
																															REMOTE CONTROL
																	X	X	X	X	X	X	X	X	X	X	X	X		TCN1224A	UNIFIED CONTROL CHASSIS
								X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		TLN8799A	SERVICE BOARD
								X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		TLN4669B	LINE DRIVER MODULE 2-WIRE 1-RECEIVER
								X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		TLN4662A	SQUELCH GATE MODULE
								X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		TLN4635B	STATION CONTROL MODULE
										X	X				X					X				X				X		TLN4661A	F1 DC TRANSFER MODULE
									X				X					X				X				X				TLN4659A	F1-"PL" DC TRANSFER MODULE
										X				X					X				X				X			TLN4658A	F1 TONE CONTROL MODULE
								X				X						X				X				X					TLN4638A	F1-"PL" TONE CONTROL MODULE
								X		X		X		X					X		X		X		X		X			TLN1245B	GUARD TONE DECODER MODULE
								X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		TLN4636A	TIME-OUT TIMER MODULE
																														T1487AF	DUPLEXER
																	4	4	4	4	4	4	4	4	4	4	4	4		TLD8392A	CAVITY FILTER
																	2	2	2	2	2	2	2	2	2	2	2	2		TKN6471A	RF CABLE
																	X	X	X	X	X	X	X	X	X	X	X	X		TKN6473A	RF CABLE
																	X	X	X	X	X	X	X	X	X	X	X	X		TKN6474A	RF CABLE
																	X	X	X	X	X	X	X	X	X	X	X	X		TLN4566A	HARDWARE KIT, MOUNTING (2 OR 4-CAVITIES)

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								X	X	X	X	X	X		TLN5896A	HARDWARE KIT
																"DIGITAL PRIVATE-LINE"
								2	2	2	2	2	2		TRN6005A	CODE PLUG
								X	X	X	X	X	X		TLN5729A	"DIGITAL PRIVATE-LINE" DECODER
								X	X	X	X	X	X		TLN5725A	"DIGITAL PRIVATE-LINE" ENCODER
																REMOTE CONTROL
								X	X	X	X	X	X		TCN1224A	UNIFIED CONTROL CHASSIS
								X	X	X	X	X	X		TLN8799A	SERVICE BOARD
								X	X	X	X	X	X		TLN4669B	LINE DRIVER MODULE 2-WIRE 1-RECEIVER
								X	X	X	X	X	X		TLN4662A	SQUELCH GATE MODULE
								X	X	X	X	X	X		TLN4635B	STATION CONTROL MODULE
									X		X		X		TLN4659A	F1-"PL" DC TRANSFER MODULE
								X		X		X			TLN4638A	F1-"PL" TONE CONTROL MODULE
								X		X	X	X			TLN1245B	GUARD TONE DECODER MODULE
								X	X	X	X	X	X		TLN4636A	TIME-OUT TIMER MODULE
															T1487AF	DUPLEXER
								4	4	4	4	4	4		TLD8392A	CAVITY FILTER
								2	2	2	2	2	2		TKN6471A	RF CABLE
								X	X	X	X	X	X		TKN6473A	RF CABLE
								X	X	X	X	X	X		TKN6474A	RF CABLE
								X	X	X	X	X	X		TLN4566A	HARDWARE KIT, MOUNTING (2 OR 4-CAVITIES)

EPS-22908-C

RCB "DT" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
REPEATER (RT) STATIONS
CONTINUOUS & INTERMITTENT DUTY
CARRIER SQUELCH AND "PRIVATE-LINE" TONE-CODED SQUELCH
132-174 MHz

CODE:

☒ = ONE ITEM SUPPLIED

☐ = DUPLEXER UNIT SUPPLIED ONLY WHEN USED ABOVE 148 MHz AND TRANSMIT-RECEIVE FREQUENCIES ARE SEPARATED BY 1.5 MHz OR GREATER.

* = INDICATES A MODEL SERIES. SPECIFIC MODEL DEPENDS ON CARRIER FREQUENCY. (NOTE: 60-WATT STATIONS AVAILABLE ONLY FOR 150.8 - 174 MHz)

STATION MODEL VARIABLES

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER & NUMBER COMBINATIONS.

C53RCB-1105DT

5 = DC REMOTE CONTROL
6 = TONE REMOTE CONTROL

1 = CARRIER SQUELCH
3 = "PRIVATE-LINE" TONE-CODED SQUELCH

C = CONTINUOUS DUTY
T = INTERMITTENT DUTY

5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 = 100 W RF OUTPUT WITH CONTINUOUS DUTY STATIONS
110 W RF OUTPUT WITH INTERMITTENT DUTY

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	CONTROL TYPE	FCC LICENSE DESIGNATION	TRANSMITTER	*TLD1700C POWER AMPLIFIER, 60-WATT CONTINUOUS DUTY	*TLD1690C POWER AMPLIFIER, 100-WATT CONTINUOUS DUTY	*TLD2060A EXCITER-FILTER	TLN5902A SHIELD, TRANSMITTER	KNX1019B CHANNEL ELEMENT, TRANSMITTER	*TTD1690BA TRANSMITTER, 90/110-WATT INTERMITTENT DUTY	RECEIVER	*TLD8270B RF & IF BOARD, RECEIVER	TRN6006A AUDIO & SQUELCH BOARD	TLN4290B AUDIO POWER AMPLIFIER, RECEIVER	K1005A CHANNEL ELEMENT, RECEIVER	TLN1435B SHIELD AND FILTER, RECEIVER	TLN5654A HARDWARE KIT, "PL" DECODER	TLN5903A SHIELD, RECEIVER	MISCELLANEOUS	TPN1110B POWER SUPPLY	TKN6581A RF CABLE	TKN6883A RF CABLE KIT	TLN5896A HARDWARE KIT	TKN6616A STATION INTERCABLING (INTERMITTENT DUTY STATIONS)	TLN4859A HARDWARE, CABINET (INTERMITTENT DUTY STATIONS)	THN6142A CABINET (CONTINUOUS DUTY STATIONS)	THN6141A CABINET (INTERMITTENT DUTY STATIONS)	"PRIVATE-LINE"	TLN5731A "PL" ENCODER	TRN6002A "PL" DECODER	TLN6824A "VIBRASENDER" RESONANT REED	TLN8381A "VIBRASPONDER" RESONANT REED	TLN6210A SENDER	REMOTE CONTROL	TCN1224A UNIFIED CONTROL CHASSIS	TLN8799A SERVICE BOARD	TLN4669B LINE DRIVER MODULE 2-WIRE 1-RECEIVER	TLN4662A SQUELCH GATE MODULE	TLN4635B STATION CONTROL MODULE	TLN4661A F1 DC TRANSFER MODULE	TLN4659A F1-"PL" DC TRANSFER MODULE	TLN4658A F1 TONE CONTROL MODULE	TLN4638A F1-"PL" TONE CONTROL MODULE	TLN1245B GUARD TONE DECODER MODULE	TLN4636A TIME-OUT TIMER MODULE	T1487AF DUPLEXER	TLD8392A CAVITY FILTER	TKN6471A RF CABLE	TKN6473A RF CABLE	TKN6474A RF CABLE	TLN4566A HARDWARE KIT, MOUNTING (2 OR 4-CAVITIES)		
CONTINUOUS DUTY STATIONS																																																						
C53RCB-1105DT	60	CARRIER	DC	CC3185		X				X	X		X	X	X	X			X		X	X	X	X			X									X	X	X	X	X	X					X		4	2	X	X	X		
C53RCB-1106DT	60	CARRIER	TONE	CC3185		X				X	X		X	X	X	X			X		X	X	X	X			X									X	X	X	X	X			X		X	X		4	2	X	X	X		
C53RCB-3105DT	60	TONE-CODED	DC	CC3185		X		X		X	X		X	X	X	X		X	X		X	X	X	X			X			X	X	X	X	X		X	X	X	X	X		X				X		4	2	X	X	X		
C53RCB-3106DT	60	TONE-CODED	TONE	CC3185		X		X		X	X		X	X	X	X	X	X	X		X	X	X	X			X			X	X	X	X	X		X	X	X	X	X				X	X	X		4	2	X	X	X		
C63RCB-1105DT	90	CARRIER	DC	CC3193			X			X	X		X	X	X	X			X		X	X	X	X			X									X	X	X	X	X	X					X		4	2	X	X	X		
C63RCB-1106DT	90	CARRIER	TONE	CC3193			X			X	X		X	X	X	X			X		X	X	X	X			X									X	X	X	X	X			X		X	X		4	2	X	X	X		
C63RCB-3105DT	90	TONE-CODED	DC	CC3193			X	X		X	X		X	X	X	X		X	X		X	X	X	X			X			X	X	X	X	X		X	X	X	X	X		X				X		4	2	X	X	X		
C63RCB-3106DT	90	TONE-CODED	TONE	CC3193			X	X		X	X		X	X	X	X		X	X		X	X	X	X			X			X	X	X	X	X		X	X	X	X	X				X	X	X		4	2	X	X	X		
C73RCB-1105DT	100	CARRIER	DC	CC3184			X			X	X		X	X	X	X			X		X	X	X	X			X									X	X	X	X	X	X					X		4	2	X	X	X		
C73RCB-1106DT	100	CARRIER	TONE	CC3184			X			X	X		X	X	X	X			X		X	X	X	X			X									X	X	X	X	X			X		X	X		4	2	X	X	X		
C73RCB-3105DT	100	TONE-CODED	DC	CC3184			X	X		X	X		X	X	X	X		X	X		X	X	X	X			X			X	X	X	X	X		X	X	X	X	X		X				X		4	2	X	X	X		
C73RCB-3106DT	100	TONE-CODED	TONE	CC3184			X	X		X	X		X	X	X	X		X	X		X	X	X	X			X			X	X	X	X	X		X	X	X	X	X				X		X		4	2	X	X	X		
INTERMITTENT DUTY STATIONS																																																						
C63RTB-1105CT	90	CARRIER	DC	CC3182							X	X				X	X				X				X	X		X									X	X	X	X	X					X								
C63RTB-1106CT	90	CARRIER	TONE	CC3182							X	X				X	X				X				X	X		X									X	X	X	X			X		X	X								
C63RTB-3105CT	90	TONE-CODED	DC	CC3182							X	X				X	X				X				X	X		X		X	X	X	X				X	X	X	X		X				X								
C63RTB-3106CT	90	TONE-CODED	TONE	CC3182							X	X				X	X				X				X	X		X		X	X	X	X				X	X	X	X				X	X	X								
C73RTB-1105CT	110	CARRIER	DC	CC3183							X	X				X	X				X				X	X		X									X	X	X	X	X					X								
C73RTB-1106CT	110	CARRIER	TONE	CC3183							X	X				X	X				X				X	X		X									X	X	X	X	X		X		X	X								
C73RTB-3105CT	110	TONE-CODED	DC	CC3183							X	X				X	X				X				X	X		X		X	X	X	X				X	X	X	X		X				X								
C73RTB-3106CT	110	TONE-CODED	TONE	CC3183							X	X				X	X				X				X	X		X		X	X	X	X				X	X	X	X				X	X	X								

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RCB "BT" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
REPEATER (RT) STATIONS
CONTINUOUS & INTERMITTENT DUTY
"DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH
132-174 MHz

CODE:

$\boxed{X}$ = ONE ITEM SUPPLIED

$\boxed{0}$ = DUPLEXER UNIT SUPPLIED ONLY WHEN USED ABOVE 148 MHz AND TRANSMIT-RECEIVE FREQUENCIES ARE SEPARATED BY 1.5 MHz OR GREATER.

* = INDICATES A MODEL SERIES. SPECIFIC MODEL DEPENDS ON CARRIER FREQUENCY. (NOTE: 60-WATT STATIONS AVAILABLE ONLY FOR 150.8-174 MHz.)

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER & NUMBER COMBINATIONS.

C53RCB-6105BT
5 = DC REMOTE CONTROL
6 = TONE REMOTE CONTROL
6 = "DIGITAL PRIVATE-LINE" SQUELCH
C = CONTINUOUS DUTY
T = INTERMITTENT DUTY
5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 = 100 W RF OUTPUT WITH CONTINUOUS DUTY STATIONS
110 W RF OUTPUT WITH INTERMITTENT DUTY

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	CONTROL TYPE	FCC LICENSE DESIGNATION
CONTINUOUS DUTY STATIONS				
C53RCB-6105BT	60	"DPL"	DC	CC3185
C53RCB-6106BT	60	"DPL"	TONE	CC3185
C63RCB-6105BT	90	"DPL"	DC	CC3193
C63RCB-6106BT	90	"DPL"	TONE	CC3193
C73RCB-6105BT	100	"DPL"	DC	CC3184
C73RCB-6106BT	100	"DPL"	TONE	CC3184

DESCRIPTION	TRANSMITTER						RECEIVER					
	POWER AMPLIFIER, 60-WATT CONTINUOUS DUTY	POWER AMPLIFIER, 100-WATT CONTINUOUS DUTY	EXCITER FILTER	HARDWARE KIT, "PL" ENCODER	SHIELD, TRANSMITTER	CHANNEL ELEMENT, TRANSMITTER	CHANNEL ELEMENT, RECEIVER	RF & IF BOARD, RECEIVER	AUDIO POWER AMPLIFIER, RECEIVER	AUDIO & SQUELCH BOARD	HARDWARE KIT, "PL" DECODER	SHIELD, RECEIVER
ITEM	*TLD1700C	*TLD1690C	*TLD2060A	TRN6188A	TLN5902A	KXN1019B	K1005A	*TLD8270B	TLN4290B	TRN6006A	TLN5654A	TLN5903A
C53RCB-6105BT	X		X	X	X	X	X	X	X	X	X	X
C53RCB-6106BT	X		X	X	X	X	X	X	X	X	X	X
C63RCB-6105BT		X	X	X	X	X	X	X	X	X	X	X
C63RCB-6106BT		X	X	X	X	X	X	X	X	X	X	X
C73RCB-6105BT		X	X	X	X	X	X	X	X	X	X	X
C73RCB-6106BT		X	X	X	X	X	X	X	X	X	X	X

DESCRIPTION	MISCELLANEOUS					"DIGITAL PRIVATE-LINE"		
	POWER SUPPLY	CABINET (CONTINUOUS DUTY STATIONS)	RF CABLE	RF CABLE KIT	HARDWARE KIT	CODE PLUG	"DIGITAL PRIVATE-LINE" DECODER	"DIGITAL PRIVATE-LINE' ENCODER
ITEM	TPN1110B	THN6142A	TKN6581A	TKN6883A	TLN5826A	TRN6005A	TLN5729A	TLN5725A
C53RCB-6105BT	X	X	X	X	X	2	X	X
C53RCB-6106BT	X	X	X	X	X	2	X	X
C63RCB-6105BT	X	X	X	X	X	2	X	X
C63RCB-6106BT	X	X	X	X	X	2	X	X
C73RCB-6105BT	X	X	X	X	X	2	X	X
C73RCB-6106BT	X	X	X	X	X	2	X	X

DESCRIPTION	REMOTE CONTROL														
	UNIFIED CONTROL CHASSIS	SERVICE BOARD	LINE DRIVER MODULE 2-WIRE 1-RECEIVER	SQUELCH GATE MODULE	STATION CONTROL MODULE	F1-"PL" DC TRANSFER MODULE	F1-"PL" TONE CONTROL MODULE	GUARD TONE DECODER MODULE	TIME-OUT TIMER MODULE	DUPLEXER	CAVITY FILTER	RF CABLE	RF CABLE	RF CABLE	HARDWARE KIT, MOUNTING (2 OR 4-CAVITIES)
ITEM	TCN1224A	TLN8799A	TLN4669B	TLN4662A	TLN4635B	TLN4659A	TLN4638A	TLN1245B	TLN4636A	T1487AF	TLD8392A	TKN6471A	TKN6473A	TKN6474A	TLN4566A
C53RCB-6105BT	X	X	X	X	X	X			X		4	2	X	X	X
C53RCB-6106BT	X	X	X	X	X		X	X	X		4	2	X	X	X
C63RCB-6105BT	X	X	X	X	X	X		X	X		4	2	X	X	X
C63RCB-6106BT	X	X	X	X	X		X	X	X		4	2	X	X	X
C73RCB-6105BT	X	X	X	X	X	X			X		4	2	X	X	X
C73RCB-6106BT	X	X	X	X	X		X	X	X		4	2	X	X	X

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																																			ITEM	DESCRIPTION
																																				TRANSMITTER
																			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	*TLD1700C	POWER AMPLIFIER, 60-WATT
			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																		*TLD1690C	POWER AMPLIFIER, 100-WATT
			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	*TLD2060A	EXCITER-FILTER
			X	X	X	X	X	X	X	X								X	X	X	X	X	X	X	X										TRN6188A	HARDWARE KIT, "PL" ENCODER
			2	2	2	2	2	2	X	X	2	2	2	2	2	2	X	X	2	2	2	2	2	2	X	[illegible]	2	2	2	2	2	[illegible]	X	X	KXN1019B	TRANSMITTER CHANNEL ELEMENT
																																				RECEIVER
			2	2	X	X	X	X	X	2	2	X	X	X	X	X	X	X	2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	*TLD8270B	RF & IF BOARD, RECEIVER
			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TLN4290B	AUDIO POWER AMPLIFIER, RECEIVER
			2	2	X	X	X	X	X	2	2	X	X	X	X	X	X	X	2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	TRN6006A	AUDIO & SQUELCH BOARD
			X	X						X	X								X	X							X	X							TLN1865A	SECOND RECEIVER
			O	O	2	2	X	X	X	X	O	O	2	2	X	X	X	X	O	O	2	2	X	X	X	X	O	O	2	2	X	X	X	X	K1005A	RECEIVER CHANNEL ELEMENT
			O	O							O	O							O	O							O	O							KXN1022A	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF)
			O	O							O	O							O	O							O	O							TLD8740A	SHIFTED IF KIT
			X	X							X	X							X	X							X	X							TLN4758A	2-RECEIVER COUPLER
			2	2	X	X	X	X	X	X									2	2	X	X	X	X	X	X									TLN5654A	HARDWARE KIT, "PL" DECODER
																																				MISCELLANEOUS
			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TLN8799A	SERVICE BOARD
			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TLN4295A	ANTENNA SWITCH
			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TKN6581A	RF CABLE
			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TKN6882A	RF CABLE
					X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X	TLN5896A	HARDWARE KIT
			X	X							X	X							X	X							X	X							TLN5897A	HARDWARE KIT, 2-RECEIVER
			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	THN6142A	CABINET
			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TPN1110B	POWER SUPPLY
																																				"PRIVATE-LINE"
			X	X	X	X	X	X	X	X									X	X	X	X	X	X	X	X									TLN5731A	"PL" ENCODER
			X	X	X	X	X	X	X	X									X	X	X	X	X	X	X	X									KLN6210A	SENDER
			2	2	X	X	X	X	X	X									2	2	X	X	X	X	X	X									TRN6002A	"PL" DECODER
			2	2	X	X	X	X	X	X									2	2	X	X	X	X	X	X									TLN8381A	"VIBRASPONDER" RESONANT REED
																																				REMOTE CONTROL
			X	X	X	X	X	X	X	E	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TCN1223A	UNIFIED CONTROL CHASSIS
			X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		TLN1245B	GUARD TONE DECODER MODULE
					X								X								X								X						TLN1248A	C2-R2 TONE CONTROL MODULE
			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TLN4635B	STATION CONTROL MODULE
			X		X		X		X										X		X		X		X										TLN4638A	F1-"PL" TONE CONTROL MODULE
											X		X		X		X										X		X		X		X		TLN4658A	F1 TONE CONTROL MODULE
										X																X									TLN4659A	F1-"PL" DC TRANSFER MODULE
				X				X				X				X				X				X				X				X			TLN4660A	F2-R2 MUTE DC TRANSFER MODULE
																		X																X	TLN4661A	F1 DC TRANSFER MODULE
						X								X								X								X					TLN4663A	C2-R2 DC TRANSFER MODULE
			X				X				X				X				X				X				X				X				TLN4665A	F2 TONE CONTROL MODULE
					X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X	TLN4669B	LINE DRIVER MODULE 2-WIRE 1-RECEIVER
			X	X							X	X							X	X							X	X							TLN4670B	LINE DRIVER MODULE 2-WIRE 2-RECEIVER

CODE

☒ =

2 =

O =

* =

STATION		"DIGITAL PRIVATE-LINE"					REMOTE CONTROL													
		TTN6003A "DIGITAL PRIVATE-LINE" ENCODER	TRN6005A CODE PLUG	TLN5729A "DIGITAL PRIVATE-LINE" DECODER	TLN5725A "DIGITAL PRIVATE-LINE" ENCODER		TCN1223A UNIFIED CONTROL CHASSIS	TLN1248A C2-R2 TONE CONTROL MODULE	TLN1245B GUARD TONE DECODER MODULE	TLN4635B STATION CONTROL MODULE	TLN4638A F1-"PL" TONE CONTROL MODULE	TLN4659A F1-"PL" DC TRANSFER MODULE	TLN4660A F2-R2 MUTE DC TRANSFER MODULE	TLN4663A C2-R2 DC TRANSFER MODULE	TLN4665A F2 TONE CONTROL MODULE	TLN4669B LINE DRIVER MODULE 2-WIRE 1-RECEIVER	TLN4670B LINE DRIVER MODULE 2-WIRE 2-RECEIVER			
C53RCB-6		X	X	X			X			X		X				X				
C53RCB-6		X	X	X			X		X	X	X					X				
C53RCB-6		X	X	X			X			X			X			X				
C53RCB-6		X	X	X			X		X	X	X				X	X				
C53RCB-6		X	X	X			X			X				X		X				
C53RCB-6		X	X	X			X	X	X	X	X					X				
C53RCB-6		X	2	2			X			X			X				X			
C53RCB-6		X	2	2			X		X	X	X				X		X			
C63/C73R		X	X	X			X			X		X				X				
C63/C73R		X	X	X			X		X		X					X				
C63/C73R		X	X	X			X			X			X			X				
C63/C73R		X	X	X			X		X	X	X				X	X				
C63/C73R		X	X	X			X			X				X		X				
C63/C73R		X	X	X			X	X	X	X	X					X				
C63/C73R		X	2	2			X			X			X				X			
C63/C73R		X	2	2			X		X	X	X				X		X			

EPS-22906-C

RCB "D" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
BASE STATIONS - CONTINUOUS DUTY
CARRIER SQUELCH AND "PRIVATE-LINE" TONE-CODED SQUELCH
132-174 MHz

CODE:

- X = ONE ITEM SUPPLIED
- 2 = TWO ITEMS SUPPLIED
- O = TWO K1005A RCVR ELEMENTS SUPPLIED UNLESS RECEIVER CARRIER FREQUENCIES ARE SEPARATED BY 11.7 MHz ±30 kHz (OR A SUB-MULTIPLE THEREOF). IN THIS CASE, A K1005A CHANNEL ELEMENT IS USED IN THE FIRST RECEIVER AND A KXN1022A CHANNEL ELEMENT IS USED IN THE SECOND RECEIVER.
- * = INDICATES A SERIES OF MODELS. SPECIFIC MODEL DEPENDS UPON CARRIER FREQUENCY.

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER AND NUMBER COMBINATIONS.

C53RCB-6105B

5 = DC REMOTE CONTROL
6 = TONE REMOTE CONTROL

0 = T1-R1
1 = T2-R1
2 = T2-R2
4 = T2-2R (2 RECEIVERS)

6 = "DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH

5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 = 100 W RF OUTPUT

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	T1 = ONE XMIT FREQ. T2 = TWO XMIT FREQS. R1 = ONE RCVR FREQ. R2 = TWO RCVR FREQS. 2R = TWO RCVRS = ONE FREQ. EACH	CONTROL TYPE	FCC LICENSE DESIGNATION
C53RCB-1105D	60	C.S.	T1-R1	DC	CC3185
C53RCB-1106D	60	C.S.	T1-R1	TONE	CC3185
C53RCB-1115D	60	C.S.	T2-R1	DC	CC3185
C53RCB-1116D	60	C.S.	T2-R1	TONE	CC3185
C53RCB-1125D	60	C.S.	T2-R2	DC	CC3185
C53RCB-1126D	60	C.S.	T2-R2	TONE	CC3185
C53RCB-1145D	60	C.S.	T2-2R	DC	CC3185
C53RCB-1146D	60	C.S.	T2-2R	TONE	CC3185
C53RCB-3105D	60	"PL"	T1-R1	DC	CC3185
C53RCB-3106D	60	"PL"	T1-R1	TONE	CC3185
C53RCB-3115D	60	"PL"	T2-R1	DC	CC3185
C53RCB-3116D	60	"PL"	T2-R1	TONE	CC3185
C53RCB-3125D	60	"PL"	T2-R2	DC	CC3185
C53RCB-3126D	60	"PL"	T2-R2	TONE	CC3185
C53RCB-3145D	60	"PL"	T2-2R	DC	CC3185
C53RCB-3146D	60	"PL"	T2-2R	TONE	CC3185
C63/C73RCB-1105D	△	C.S.	T1-R1	DC	△△
C63/C73RCB-1106D	△	C.S.	T1-R1	TONE	△△
C63/C73RCB-1115D	△	C.S.	T2-R1	DC	△△
C63, C73RCB-1116D	△	C.S.	T2-R1	TONE	△△
C63/C73RCB-1125D	△	C.S.	T2-R2	DC	△△
C63/C73RCB-1126D	△	C.S.	T2-R2	TONE	△△
C63/C73RCB-1145D	△	C.S.	T2-2R	DC	△△
C63/C73RCB-1146D	△	C.S.	T2-2R	TONE	△△
C63/C73RCB-3105D	△	"PL"	T1-R1	DC	△△
C63, C73RCB-3106D	△	"PL"	T1-R1	TONE	△△
C63/C73RCB-3115D	△	"PL"	T2-R1	DC	△△
C63/C73RCB-3116D	△	"PL"	T2-R1	TONE	△△
C63, C73RCB-3125D	△	"PL"	T2-R2	DC	△△
C63, C73RCB-3126D	△	"PL"	T2-R2	TONE	△△
C63/C73RCB-3145D	△	"PL"	T2-2R	DC	△△
C63/C73RCB-3146D	△	"PL"	T2-2R	TONE	△△

STATION MODEL	TRANSMITTER					RECEIVER								
DESCRIPTION	POWER AMPLIFIER, 60-WATT	POWER AMPLIFIER, 100-WATT	EXCITER-FILTER	HARDWARE KIT, "PL" ENCODER	TRANSMITTER CHANNEL ELEMENT	RF & IF BOARD, RECEIVER	AUDIO POWER AMPLIFIER, RECEIVER	AUDIO & SQUELCH BOARD	SECOND RECEIVER	RECEIVER CHANNEL ELEMENT	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF)	SHIFTED IF KIT	2-RECEIVER COUPLER	HARDWARE KIT, "PL" DECODER
ITEM	*TLD1700C	*TLD1690C	*TLD2060A	TRN6188A	KXN1019B	*TLD8270B	TLN4290B	TRN6006A	TLN1865A	K1005A	KXN1022A	TLD8740A	TLN4758A	TLN5654A
C53RCB-1105D	X		X		X	X	X	X		X				
C53RCB-1106D	X		X		X	X	X	X		X				
C53RCB-1115D	X		X		2	X	X	X		X				
C53RCB-1116D	X		X		2	X	X	X		X				
C53RCB-1125D	X		X		2	X	X	X		2				
C53RCB-1126D	X		X		2	X	X	X		2				
C53RCB-1145D	X		X		2	2	X	2	X	O	O	O	X	
C53RCB-1146D	X		X		2	2	X	2	X	O	O	O	X	
C53RCB-3105D	X		X		X	X	X	X		X				X
C53RCB-3106D	X		X	X	X	X	X	X		X				X
C53RCB-3115D	X		X	X	2	X	X	X		X				X
C53RCB-3116D	X		X	X	2	X	X	X		X				X
C53RCB-3125D	X		X	X	2	X	X	X		2				X
C53RCB-3126D	X		X	X	2	X	X	X		2				X
C53RCB-3145D	X		X	X	2	2	X	2	X	O	O	O	X	2
C53RCB-3146D	X		X	X	2	2	X	2	X	O	O	O	X	2
C63/C73RCB-1105D		X	X	X	X	X	X	X		X				
C63/C73RCB-1106D		X	X		X	X	X	X		X				
C63/C73RCB-1115D		X	X		2	X	X	X		X				
C63, C73RCB-1116D		X	X		2	X	X	X		X				
C63/C73RCB-1125D		X	X		2	X	X	X		2				
C63/C73RCB-1126D		X	X		2	X	X	X		2				
C63/C73RCB-1145D		X	X		2	X	X	X		O	O	O	X	
C63/C73RCB-1146D		X	X		2	2	X	2	X	O	O	O	X	
C63/C73RCB-3105D		X	X	X	X	2	X	2	X	X				X
C63, C73RCB-3106D		X	X	X	X	X	X	X		X				X
C63/C73RCB-3115D		X	X	X	2	X	X	X		X				X
C63/C73RCB-3116D		X	X	X	2	X	X	X		X				X
C63, C73RCB-3125D		X	X	X	2	X	X	X		2				X
C63, C73RCB-3126D		X	X	X	2	X	X	X		2				X
C63/C73RCB-3145D		X	X	X	2	2	X	2	X	O	O	O	X	2
C63/C73RCB-3146D		X	X	X	2	2	X	2	X	O	O	O	X	2

STATION MODEL	MISCELLANEOUS								"PRIVATE-LINE"			
DESCRIPTION	SERVICE BOARD	ANTENNA SWITCH	RF CABLE	RF CABLE	HARDWARE KIT	HARDWARE KIT, 2-RECEIVER	CABINET	POWER SUPPLY	"PL" ENCODER	SENDER	"PL" DECODER	"VIBRASPONDER" RESONANT REED
ITEM	TLN8799A	TLN4295A	TKN6581A	TKN6882A	TLN5896A	TLN5897A	THN6142A	TPN1110B	TLN5731A	KLN6210A	TRN6002A	TLN8381A
C53RCB-1105D	X	X	X	X	X		X	X				
C53RCB-1106D	X	X	X	X	X		X	X				
C53RCB-1115D	X	X	X	X	X		X	X				
C53RCB-1116D	X	X	X	X	X		X	X				
C53RCB-1125D	X	X	X	X	X		X	X				
C53RCB-1126D	X	X	X	X	X		X	X				
C53RCB-1145D	X	X	X	X		X	X	X				
C53RCB-1146D	X	X	X	X		X	X	X				
C53RCB-3105D	X	X	X	X	X		X	X	X	X	X	X
C53RCB-3106D	X	X	X	X	X		X	X	X	X	X	X
C53RCB-3115D	X	X	X	X	X		X	X	X	X	X	X
C53RCB-3116D	X	X	X	X	X		X	X	X	X	X	X
C53RCB-3125D	X	X	X	X	X		X	X	X	X	X	X
C53RCB-3126D	X	X	X	X	X		X	X	X	X	X	X
C53RCB-3145D	X	X	X	X		X	X	X	X	X	2	2
C53RCB-3146D	X	X	X	X		X	X	X	X	X	2	2
C63/C73RCB-1105D	X	X	X	X	X		X	X				
C63/C73RCB-1106D	X	X	X	X	X		X	X				
C63/C73RCB-1115D	X	X	X	X	X		X	X				
C63, C73RCB-1116D	X	X	X	X	X		X	X				
C63/C73RCB-1125D	X	X	X	X	X		X	X				
C63/C73RCB-1126D	X	X	X	X	X		X	X				
C63/C73RCB-1145D	X	X	X	X		X	X	X				
C63/C73RCB-1146D	X	X	X	X		X	X	X				
C63/C73RCB-3105D	X	X	X	X	X		X	X	X	X	X	X
C63, C73RCB-3106D	X	X	X	X	X		X	X	X	X	X	X
C63/C73RCB-3115D	X	X	X	X	X		X	X	X	X	X	X
C63/C73RCB-3116D	X	X	X	X	X		X	X	X	X	X	X
C63, C73RCB-3125D	X	X	X	X	X		X	X	X	X	X	X
C63, C73RCB-3126D	X	X	X	X	X		X	X	X	X	X	X
C63/C73RCB-3145D	X	X	X	X		X	X	X	X	X	2	2
C63/C73RCB-3146D	X	X	X	X		X	X	X	X	X	2	2

STATION MODEL	REMOTE CONTROL												
DESCRIPTION	UNIFIED CONTROL CHASSIS	GUARD TONE DECODER MODULE	C2-R2 TONE CONTROL MODULE	STATION CONTROL MODULE	F1-"PL" TONE CONTROL MODULE	F1 TONE CONTROL MODULE	F1-"PL" DC TRANSFER MODULE	F2-R2 MUTE DC TRANSFER MODULE	F1 DC TRANSFER MODULE	C2-R2 DC TRANSFER MODULE	F2 TONE CONTROL MODULE	LINE DRIVER MODULE 2-WIRE 1-RECEIVER	LINE DRIVER MODULE 2-WIRE 2-RECEIVER
ITEM	TCN1223A	TLN1245B	TLN1248A	TLN4635B	TLN4638A	TLN4658A	TLN4659A	TLN4660A	TLN4661A	TLN4663A	TLN4665A	TLN4669B	TLN4670B
C53RCB-1105D	X			X					X			X	
C53RCB-1106D	X	X		X		X						X	
C53RCB-1115D	X			X				X				X	
C53RCB-1116D	X	X		X		X					X	X	
C53RCB-1125D	X			X						X		X	
C53RCB-1126D	X	X	X	X		X						X	
C53RCB-1145D	X			X				X					X
C53RCB-1146D	X	X		X		X					X		X
C53RCB-3105D	X			X			X					X	
C53RCB-3106D	X	X		X	X							X	
C53RCB-3115D	X			X				X				X	
C53RCB-3116D	X	X		X	X						X	X	
C53RCB-3125D	X			X						X		X	
C53RCB-3126D	X	X	X	X	X							X	
C53RCB-3145D	X			X				X					X
C53RCB-3146D	X	X		X	X						X		X
C63/C73RCB-1105D	X			X					X			X	
C63/C73RCB-1106D	X	X		X		X						X	
C63/C73RCB-1115D	X			X				X				X	
C63, C73RCB-1116D	X	X		X		X					X	X	
C63/C73RCB-1125D	X			X						X		X	
C63/C73RCB-1126D	X	X	X	X		X						X	
C63/C73RCB-1145D	X			X				X					X
C63/C73RCB-1146D	X	X		X		X					X		X
C63/C73RCB-3105D	X			X			X					X	
C63, C73RCB-3106D	X	X		X	X							X	
C63/C73RCB-3115D	X			X				X				X	
C63/C73RCB-3116D	X	X		X	X						X	X	
C63, C73RCB-3125D	X			X						X		X	
C63, C73RCB-3126D	X	X	X	X	X							X	
C63/C73RCB-3145D	X			X				X					X
C63/C73RCB-3146D	X	X		X	X						X		X

△ C63 SERIES = 90 W
C73 SERIES = 100 W

△△ C63 SERIES = CC3193
C73 SERIES = CC3184

RCB "B" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
BASE STATIONS - CONTINUOUS DUTY
"DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH
132-174 MHz

CODE:

X = ONE ITEM SUPPLIED

2 = TWO ITEMS SUPPLIED

O = TWO K1005A RCVR ELEMENTS SUPPLIED UNLESS RECEIVER CARRIER FREQS. ARE SEPARATED BY 11.7 MHz ±30 kHz (OR A SUB-MULTIPLE THEREOF). IN THIS CASE, A K1005A CHANNEL ELEMENT IS USED IN THE FIRST RECEIVER AND A KXN1022A CHANNEL ELEMENT IS USED IN THE SECOND RECEIVER.

* = INDICATES A SERIES OF MODELS. SPECIFIC MODEL DEPENDS UPON CARRIER FREQUENCY.

STATION MODEL VARIABLES

NOTE
STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER AND NUMBER COMBINATIONS.

C53RCB-6105B

5 = DC REMOTE CONTROL
6 = TONE REMOTE CONTROL

0 = T1-R1
1 = T2-R1
2 = T2-R2
4 = T2-2R (2 RECEIVERS)

6 = "DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH

5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 = 100 W RF OUTPUT

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	T1 = ONE XMIT FREQ. T2 = TWO XMIT FREQS. R1 = ONE RCVR FREQ. R2 = TWO RCVR FREQS. 2R = TWO RCVRS = ONE FREQ. EACH	CONTROL TYPE	FCC LICENSE DESIGNATION
C53RCB-6105B	60	"DPL"	T1-R1	DC	CC3185
C53RCB-6106B	60	"DPL"	T1-R1	TONE	CC3185
C53RCB-6115B	60	"DPL"	T2-R1	DC	CC3185
C53RCB-6116B	60	"DPL"	T2-R1	TONE	CC3185
C53RCB-6125B	60	"DPL"	T2-R2	DC	CC3185
C53RCB-6126B	60	"DPL"	T2-R2	TONE	CC3185
C53RCB-6145B	60	"DPL"	T2-2R	DC	CC3185
C53RCB-6146B	60	"DPL"	T2-2R	TONE	CC3185
C63/C73RCB-6105B	△	"DPL"	T1-R1	DC	△△
C63/C73RCB-6106B	△	"DPL"	T1-R1	TONE	△△
C63/C73RCB-6115B	△	"DPL"	T2-R1	DC	△△
C63/C73RCB-6116B	△	"DPL"	T2-R1	TONE	△△
C63/C73RCB-6125B	△	"DPL"	T2-R2	DC	△△
C63/C73RCB-6126B	△	"DPL"	T2-R2	TONE	△△
C63/C73RCB-6145B	△	"DPL"	T2-2R	DC	△△
C63/C73RCB-6146B	△	"DPL"	T2-2R	TONE	△△

DESCRIPTION	TRANSMITTER				RECEIVER							
	POWER AMPLIFIER, 60-WATT	POWER AMPLIFIER, 100-WATT	EXCITER-FILTER	TRANSMITTER CHANNEL ELEMENT	RF & IF BOARD, RECEIVER	AUDIO POWER AMPLIFIER, RECEIVER	AUDIO & SQUELCH BOARD	SECOND RECEIVER	RECEIVER CHANNEL ELEMENT	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF)	SHIFTED IF KIT	2-RECEIVER COUPLER
MODEL	*TLD1700C	*TLD1690C	*TLD2060A	KXN1019B	*TLD8270B	TLN4290B	TRN6006A	TLN1865A	K1005A	KXN1022A	TLD8740A	TLN4758A
C53RCB-6105B	X		X	X	X	X	X	X	X			
C53RCB-6106B	X		X	X	X	X	X		X			
C53RCB-6115B	X		X	2	X	X	X		X			
C53RCB-6116B	X		X	2	X	X	X		X			
C53RCB-6125B	X		X	2	X	X	X		2			
C53RCB-6126B	X		X	2	X	X	X		2			
C53RCB-6145B	X		X	2	2	X	2	X	O	O	O	X
C53RCB-6146B	X		X	2	2	X	2	X	O	O	O	X
C63/C73RCB-6105B		X	X	X	X	X	X		X			
C63/C73RCB-6106B		X	X	X	X	X	X		X			
C63/C73RCB-6115B		X	X	2	X	X	X		X			
C63/C73RCB-6116B		X	X	2	X	X	X		X			
C63/C73RCB-6125B		X	X	2	X	X	X		2			
C63/C73RCB-6126B		X	X	2	X	X	X		2			
C63/C73RCB-6145B		X	X	2	2	X	2	X	O	O	O	X
C63/C73RCB-6146B		X	X	2	2	X	2	X	O	O	O	X

DESCRIPTION	MISCELLANEOUS									
	SERVICE BOARD	▲ANTENNA SWITCH	RF CABLE	RF CABLE	HARDWARE KIT, "PL" DECODER	HARDWARE KIT	HARDWARE KIT, "PL" ENCODER	HARDWARE KIT, 2-RECEIVER	CABINET	POWER SUPPLY
MODEL	TLN8799A	TLN4295A	TKN6581A	TKN6882A	TLN5654A	TLN5896A	TRN6188A	TLN5897A	THN6142A	TPN1110B
C53RCB-6105B	X	X	X	X	X	X	X		X	X
C53RCB-6106B	X	X	X	X	X	X	X		X	X
C53RCB-6115B	X	X	X	X	X	X	X		X	X
C53RCB-6116B	X	X	X	X	X	X	X		X	X
C53RCB-6125B	X	X	X	X	X	X	X		X	X
C53RCB-6126B	X	X	X	X	X	X	X		X	X
C53RCB-6145B	X	X	X	X	2		X	X	X	X
C53RCB-6146B	X	X	X	X	2		X	X	X	X
C63/C73RCB-6105B	X	X	X	X	X	X	X		X	X
C63/C73RCB-6106B	X	X	X	X	X	X	X		X	X
C63/C73RCB-6115B	X	X	X	X	X	X	X		X	X
C63/C73RCB-6116B	X	X	X	X	X	X	X		X	X
C63/C73RCB-6125B	X	X	X	X	X	X	X		X	X
C63/C73RCB-6126B	X	X	X	X	X	X	X		X	X
C63/C73RCB-6145B	X	X	X	X	2		X	X	X	X
C63/C73RCB-6146B	X	X	X	X	2		X	X	X	X

DESCRIPTION	"DIGITAL PRIVATE-LINE"				REMOTE CONTROL										
	"DIGITAL PRIVATE-LINE" ENCODER	CODE PLUG	"DIGITAL PRIVATE-LINE" DECODER	"DIGITAL PRIVATE-LINE" ENCODER	UNIFIED CONTROL CHASSIS	C2-R2 TONE CONTROL MODULE	GUARD TONE DECODER MODULE	STATION CONTROL MODULE	F1-"PL" TONE CONTROL MODULE	F1-"PL" DC TRANSFER MODULE	F2-R2 MUTE DC TRANSFER MODULE	C2-R2 DC TRANSFER MODULE	F2 TONE CONTROL MODULE	LINE DRIVER MODULE 2-WIRE 1-RECEIVER	LINE DRIVER MODULE 2-WIRE 2-RECEIVER
MODEL	TTN6003A	TRN6005A	TLN5729A	TLN5725A	TCN1223A	TLN1248A	TLN1245B	TLN4635B	TLN4638A	TLN4659A	TLN4660A	TLN4663A	TLN4665A	TLN4669B	TLN4670B
C53RCB-6105B	X	X	X		X			X		X				X	
C53RCB-6106B	X	X	X		X		X	X	X					X	
C53RCB-6115B	X	X	X		X			X			X			X	
C53RCB-6116B	X	X	X		X		X	X	X				X	X	
C53RCB-6125B	X	X	X		X			X				X		X	
C53RCB-6126B	X	X	X		X	X	X	X	X					X	
C53RCB-6145B	X	2	2		X			X			X				X
C53RCB-6146B	X	2	2		X		X	X	X				X		X
C63/C73RCB-6105B	X	X	X		X			X		X				X	
C63/C73RCB-6106B	X	X	X		X		X		X					X	
C63/C73RCB-6115B	X	X	X		X			X			X			X	
C63/C73RCB-6116B	X	X	X		X		X	X	X				X	X	
C63/C73RCB-6125B	X	X	X		X			X				X		X	
C63/C73RCB-6126B	X	X	X		X	X	X	X	X					X	
C63/C73RCB-6145B	X	2	2		X			X			X				X
C63/C73RCB-6146B	X	2	2		X		X	X	X				X		X

△C63 SERIES = 90 W
C73 SERIES = 100 W

△△C63 SERIES = CC3193
C73 SERIES = CC3184

EPS-22906-C

MOTOROLA

MODEL CHART
FOR
CONTINUOUS DUTY
POWER AMPLIFIER
MODEL BREAKDOWN CHART

CODE:

☒ = ONE INCLUDED

MODEL	DESCRIPTION	TLD8620A POWER CONTROL BOARD 90/100/110 W	TLD8610A POWER CONTROL BOARD 60 W	TLD8302A 100 W POWER AMPLIFIER BOARD (132-150.8 MHz)	TLD5483A 100 W POWER AMPLIFIER BOARD (150.8-162 MHz)	TLD5484A 100 W POWER AMPLIFIER BOARD (162-174 MHz)	TFD6101A HARMONIC FILTER (132-150.8 MHz)	TFD6102A HARMONIC FILTER (150.8-174 MHz)	TLN4741A 100 W PA HARDWARE	TLN4780A PA CASTING & HARDWARE ASSEMBLY	TRN8012A INPUT BRACKET & CABLE	TLD8313A 60 W POWER AMPLIFIER BOARD (150.8-162 MHz)	TLD8314A 60 W POWER AMPLIFIER BOARD (162-174 MHz)	TLN4742A 60 W PA HARDWARE	TRN6444A RESISTOR-CAPACITOR NETWORK (60 W)	TRN6445A RESISTOR-CAPACITOR NETWORK (90-110 W)	TLD5502A RESISTOR-CAPACITOR NETWORK (110 W)	TLD5321A EXCITER BOARD (132-150.8 MHz)	TLD5322A EXCITER BOARD (150.8-174 MHz)	TRN8069A RESISTOR-CAPACITOR NETWORK (110 W)
TLD1692C	100 W POWER AMPLIFIER (132-150.8 MHz)	X		X			X		X	X	X									X
TLD1693D	100 W POWER AMPLIFIER (150.8-162 MHz)	X			X			X	X	X	X					X				
TLD1694D	100 W POWER AMPLIFIER (162-174 MHz)	X				X		X	X	X	X						X			
TLD1703C	60 W POWER AMPLIFIER (150.8-162 MHz)		X					X		X	X	X		X	X					
TLD1704C	60 W POWER AMPLIFIER (162-174 MHz)		X					X					X	X	X					

EPS-22905-B

MOTOROLA

MODEL CHART
FOR
CONTINUOUS DUTY
EXCITER-FILTER
AND
UNIFIED CONTROL CHASSIS
MODEL BREAKDOWN CHART

CODE:

☒ = ONE INCLUDED

* = INDICATES ITEM COVERED IN CONTROL AND APPLICATIONS MANUAL 68P81025E60.

MODEL	DESCRIPTION	TLD5321A EXCITER BOARD (132-150.8 MHz)	TLD5322A EXCITER BOARD (150.8-174 MHz)	TFD6111A EXCITER FILTER (132-150.8 MHz)	TFD6112A EXCITER FILTER (150.8-174 MHz)	TLN5644A *INTERCONNECT BOARD	TLN5648A RECEIVER INTERCONNECT BOARD (BASE)	TLN5646A RECEIVER INTERCONNECT BOARD (RPTR)	TRN6196A RECEIVER INTERCONNECT BOARD (FULL FILTERING OPTION)	TLN5893A TRANSMITTER INTERCONNECT BOARD (BASE)	TLN5894A TRANSMITTER INTERCONNECT BOARD (RPTR)	TLN5895A TRANSMITTER INTERCONNECT BOARD (FULL FILTERING OPTION)	TKN6570A RF CABLE ASSEMBLY, RECEIVER	TLN5892A *CHASSIS & HARDWARE KIT
	EXCITER-FILTER													
TLD2061A	(132-150.8 MHz)	X		X										
TLD2062A	(150.8-174 MHz)		X		X									
	UNIFIED CONTROL CHASSIS													
TCN1223A	BASE STATION					X	X			X			X	X
TCN1224A	REPEATER STATION					X		X			X		X	X
TCN1225A	BASE & RPTR STATIONS (FULL FILTERING OPTION)					X			X			X	X	X

EPS-22966-O

CO

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* REMOTE CONTROL

STATIO	TCN1107A	TLN1245B	TLN1248A	TLN4635B	TLN4638A	TLN4658A	TLN4659A	TLN4660A	TLN4661A	TLN4663A	TLN4665A	TLN4669B	TLN4670B
	REMOTE CONTROL CHASSIS	GUARD TONE DECODER MODULE	C2-R2 TONE CONTROL MODULE	STATION CONTROL MODULE	F1-"PL" TONE CONTROL MODULE	F1 TONE CONTROL MODULE	F1-"PL" DC TRANSFER MODULE	F2-R2 MUTE DC TRANSFER MODULE	F1-CS DC TRANSFER MODULE	C2-R2 DC TRANSFER MODULE	F2 TONE CONTROL MODULE	LINE DRIVER MODULE/2-WIRE 1-RECEIVER	LINE DRIVER MODULE/2-WIRE 2-RECEIVER
C53RT	☒			☒					☒			☒	
C53RT	☒	☒		☒		☒						☒	
C53RT	☒			☒				☒				☒	
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C63RT	☒			☒				☒					☒
C63RT	☒	☒		☒	☒						☒		☒
C73RT	☒			☒					☒			☒	
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MOTOROLA

MODEL CHART
FOR
CONTINUOUS DUTY
EXCITER-FILTER
AND
UNIFIED CONTROL CHASSIS
MODEL BREAKDOWN CHART

CODE:

☒ = ONE INCLUDED

* = INDICATES ITEM COVERED IN CONTROL AND APPLICATIONS MANUAL 68P81025E60.

MODEL	DESCRIPTION	TLD5321A EXCITER BOARD (132-150.8 MHz)	TLD5322A EXCITER BOARD (150.8-174 MHz)	TFD6111A EXCITER FILTER (132-150.8 MHz)	TFD6112A EXCITER FILTER (150.8-174 MHz)	TLN5644A *INTERCONNECT BOARD	TLN5648A RECEIVER INTERCONNECT BOARD (BASE)	TLN5646A RECEIVER INTERCONNECT BOARD (RPTR)	TRN6196A RECEIVER INTERCONNECT BOARD (FULL FILTERING OPTION)	TLN5893A TRANSMITTER INTERCONNECT BOARD (BASE)	TLN5894A TRANSMITTER INTERCONNECT BOARD (RPTR)	TLN5895A TRANSMITTER INTERCONNECT BOARD (FULL FILTERING OPTION)	TKN6570A RF CABLE ASSEMBLY, RECEIVER	TLN5892A *CHASSIS & HARDWARE KIT
	EXCITER-FILTER													
TLD2061A	(132-150.8 MHz)	X		X										
TLD2062A	(150.8-174 MHz)		X		X									
	UNIFIED CONTROL CHASSIS													
TCN1223A	BASE STATION					X	X			X			X	X
TCN1224A	REPEATER STATION					X		X			X		X	X
TCN1225A	BASE & RPTR STATIONS (FULL FILTERING OPTION)					X			X			X	X	X

EPS-22966-O

RTB "C" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
BASE STATIONS-INTERMITTENT DUTY
CARRIER SQUELCH AND "PRIVATE-LINE" TONE-CODED SQUELCH
132-174 MHz
"C" SUFFIX MODELS

CODE:

☒ = ONE ITEM SUPPLIED
2 = TWO ITEMS SUPPLIED
0 = TWO K1005A RCVR ELEMENTS SUPPLIED UNLESS RECEIVER CARRIER FREQS. ARE SEPARATED BY 11.7 MHz ±30 kHz (OR A SUB-MULTIPLE THEREOF). IN THIS CASE A K1005A CHANNEL ELEMENT IS USED IN FIRST RECEIVER AND A KXN1022A CHANNEL ELEMENT IS USED IN SECOND RECEIVER. THE IF OF THE SECOND RECEIVER IS SHIFTED.
* INDICATES A SERIES OF MODELS. SPECIFIC MODEL DEPENDS UPON CARRIER FREQUENCY.

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER AND NUMBER COMBINATIONS.

C53RTB-1105C
5 = DC REMOTE CONTROL
6 = TONE REMOTE CONTROL
0 = T1-R1
1 = T2-R1
2 = T2-R2
4 = T2-2R (2 RECEIVERS)
1 = CARRIER SQUELCH
3 = "PRIVATE-LINE" TONE-CODED SQUELCH
5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 = 110 W RF OUTPUT

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	T1 = ONE XMIT FREQ. T2 = TWO XMIT FREQS. R1 = ONE RCVR FREQ. R2 = TWO RCVR FREQS. 2R = TWO RCVRS - ONE FREQ. EACH	CONTROL TYPE	FCC LICENSE DESIGNATION
C53RTB-1105C	60	CARRIER	T1-R1	DC	CC3181
C53RTB-1106C	60	CARRIER	T1-R1	TONE	CC3181
C53RTB-1115C	60	CARRIER	T2-R1	DC	CC3181
C53RTB-1116C	60	CARRIER	T2-R1	TONE	CC3181
C53RTB-1125C	60	CARRIER	T2-R2	DC	CC3181
C53RTB-1126C	60	CARRIER	T2-R2	TONE	CC3181
C53RTB-1145C	60	CARRIER	T2-2R	DC	CC3181
C53RTB-1146C	60	CARRIER	T2-2R	TONE	CC3181
C53RTB-3105C	60	"PL"	T1-R1	DC	CC3181
C53RTB-3106C	60	"PL"	T1-R1	TONE	CC3181
C53RTB-3115C	60	"PL"	T2-R1	DC	CC3181
C53RTB-3116C	60	"PL"	T2-R1	TONE	CC3181
C53RTB-3125C	60	"PL"	T2-R2	DC	CC3181
C53RTB-3126C	60	"PL"	T2-R2	TONE	CC3181
C53RTB-3145C	60	"PL"	T2-2R	DC	CC3181
C53RTB-3146C	60	"PL"	T2-2R	TONE	CC3181
C63RTB-1105C	90	CARRIER	T1-R1	DC	CC3182
C63RTB-1106C	90	CARRIER	T1-R1	TONE	CC3182
C63RTB-1115C	90	CARRIER	T2-R1	DC	CC3182
C63RTB-1116C	90	CARRIER	T2-R1	TONE	CC3182
C63RTB-1125C	90	CARRIER	T2-R2	DC	CC3182
C63RTB-1126C	90	CARRIER	T2-R2	TONE	CC3182
C63RTB-1145C	90	CARRIER	T2-2R	DC	CC3182
C63RTB-1146C	90	CARRIER	T2-2R	TONE	CC3182
C63RTB-3105C	90	"PL"	T1-R1	DC	CC3182
C63RTB-3106C	90	"PL"	T1-R1	TONE	CC3182
C63RTB-3115C	90	"PL"	T2-R1	DC	CC3182
C63RTB-3116C	90	"PL"	T2-R1	TONE	CC3182
C63RTB-3125C	90	"PL"	T2-R2	DC	CC3182
C63RTB-3126C	90	"PL"	T2-R2	TONE	CC3182
C63RTB-3145C	90	"PL"	T2-2R	DC	CC3182
C63RTB-3146C	90	"PL"	T2-2R	TONE	CC3182
C73RTB-1105C	110	CARRIER	T1-R1	DC	CC3183
C73RTB-1106C	110	CARRIER	T1-R1	TONE	CC3183
C73RTB-1115C	110	CARRIER	T2-R1	DC	CC3183
C73RTB-1116C	110	CARRIER	T2-R1	TONE	CC3183
C73RTB-1125C	110	CARRIER	T2-R2	DC	CC3183
C73RTB-1126C	110	CARRIER	T2-R2	TONE	CC3183
C73RTB-1145C	110	CARRIER	T2-2R	DC	CC3183
C73RTB-1146C	110	CARRIER	T2-2R	TONE	CC3183
C73RTB-3105C	110	"PL"	T1-R1	DC	CC3183
C73RTB-3106C	110	"PL"	T1-R1	TONE	CC3183
C73RTB-3115C	110	"PL"	T2-R1	DC	CC3183
C73RTB-3116C	110	"PL"	T2-R1	TONE	CC3183
C73RTB-3125C	110	"PL"	T2-R2	DC	CC3183
C73RTB-3126C	110	"PL"	T2-R2	TONE	CC3183
C73RTB-3145C	110	"PL"	T2-2R	DC	CC3183
C73RTB-3146C	110	"PL"	T2-2R	TONE	CC3183

STATION MODEL	TRANSMITTER	TRANSMITTER 60 W *TTD1700B	TRANSMITTER 90-110 W *TTD1690BA	TRANSMITTER CHANNEL ELEMENT KXN1019B	RECEIVER	RECEIVER *TRD1800BB	RECEIVER CHANNEL ELEMENT K1005A	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF) KXN1022A	SHIFTED IF KIT TLD8740A	2-RECEIVER COUPLER TLN4758A	MISCELLANEOUS	SERVICE BOARD TLN8799A	ANTENNA SWITCH TLN4295A	HARDWARE, CABINET TLN4735A	CABINET THN6141A	POWER SUPPLY (FORMERLY TPN1110A) TPN1110B	STATION INTERCABLING (1-RECEIVER STATIONS) TKN6561A	STATION INTERCABLING (2-RECEIVER STATIONS) TKN6562A
C53RTB-1105C		☒		☒		☒	☒					☒	☒	☒	☒	☒	☒	
C53RTB-1106C		☒		☒		☒	☒					☒	☒	☒	☒	☒	☒	
C53RTB-1115C		☒		2		☒	☒					☒	☒	☒	☒	☒	☒	
C53RTB-1116C		☒		2		☒	☒					☒	☒	☒	☒	☒	☒	
C53RTB-1125C		☒		2		☒	2					☒	☒	☒	☒	☒	☒	
C53RTB-1126C		☒		2		☒	2					☒	☒	☒	☒	☒	☒	
C53RTB-1145C		☒		2		2	0	0	0	☒		☒	☒	☒	☒	☒		☒
C53RTB-1146C		☒		2		2	0	0	0	☒		☒	☒	☒	☒	☒		☒
C53RTB-3105C		☒		☒		☒	☒					☒	☒	☒	☒	☒	☒	
C53RTB-3106C		☒		☒		☒	☒					☒	☒	☒	☒	☒	☒	
C53RTB-3115C		☒		2		☒	☒					☒	☒	☒	☒	☒	☒	
C53RTB-3116C		☒		2		☒	☒					☒	☒	☒	☒	☒	☒	
C53RTB-3125C		☒		2		☒	2					☒	☒	☒	☒	☒	☒	
C53RTB-3126C		☒		2		☒	2					☒	☒	☒	☒	☒	☒	
C53RTB-3145C		☒		2		2	0	0	0	☒		☒	☒	☒	☒	☒		☒
C53RTB-3146C		☒		2		2	0	0	0	☒		☒	☒	☒	☒	☒		☒
C63RTB-1105C			☒	☒		☒	☒					☒	☒	☒	☒	☒	☒	
C63RTB-1106C			☒	☒		☒	☒					☒	☒	☒	☒	☒	☒	
C63RTB-1115C			☒	2		☒	☒					☒	☒	☒	☒	☒	☒	
C63RTB-1116C			☒	2		☒	☒					☒	☒	☒	☒	☒	☒	
C63RTB-1125C			☒	2		☒	2					☒	☒	☒	☒	☒	☒	
C63RTB-1126C			☒	2		☒	2					☒	☒	☒	☒	☒	☒	
C63RTB-1145C			☒	2		2	0	0	0	☒		☒	☒	☒	☒	☒		☒
C63RTB-1146C			☒	2		2	0	0	0	☒		☒	☒	☒	☒	☒		☒
C63RTB-3105C			☒	☒		☒	☒					☒	☒	☒	☒	☒	☒	
C63RTB-3106C			☒	☒		☒	☒					☒	☒	☒	☒	☒	☒	
C63RTB-3115C			☒	2		☒	☒					☒	☒	☒	☒	☒	☒	
C63RTB-3116C			☒	2		☒	☒					☒	☒	☒	☒	☒	☒	
C63RTB-3125C			☒	2		☒	2					☒	☒	☒	☒	☒	☒	
C63RTB-3126C			☒	2		☒	2					☒	☒	☒	☒	☒	☒	
C63RTB-3145C			☒	2		2	0	0	0	☒		☒	☒	☒	☒	☒		☒
C63RTB-3146C			☒	2		2	0	0	0	☒		☒	☒	☒	☒	☒		☒
C73RTB-1105C			☒	☒		☒	☒					☒	☒	☒	☒	☒	☒	
C73RTB-1106C			☒	☒		☒	☒					☒	☒	☒	☒	☒	☒	
C73RTB-1115C			☒	2		☒	☒					☒	☒	☒	☒	☒	☒	
C73RTB-1116C			☒	2		☒	☒					☒	☒	☒	☒	☒	☒	
C73RTB-1125C			☒	2		☒	2					☒	☒	☒	☒	☒	☒	
C73RTB-1126C			☒	2		☒	2					☒	☒	☒	☒	☒	☒	
C73RTB-1145C			☒	2		2	0	0	0	☒		☒	☒	☒	☒	☒		☒
C73RTB-1146C			☒	2		2	0	0	0	☒		☒	☒	☒	☒	☒		☒
C73RTB-3105C			☒	☒		☒	☒					☒	☒	☒	☒	☒	☒	
C73RTB-3106C			☒	☒		☒	☒					☒	☒	☒	☒	☒	☒	
C73RTB-3115C			☒	2		☒	☒					☒	☒	☒	☒	☒	☒	
C73RTB-3116C			☒	2		☒	☒					☒	☒	☒	☒	☒	☒	
C73RTB-3125C			☒	2		☒	2					☒	☒	☒	☒	☒	☒	
C73RTB-3126C			☒	2		☒	2					☒	☒	☒	☒	☒	☒	
C73RTB-3145C			☒	2		2	0	0	0	☒		☒	☒	☒	☒	☒		☒
C73RTB-3146C			☒	2		2	0	0	0	☒		☒	☒	☒	☒	☒		☒

STATION MODEL	"PRIVATE-LINE"	"PL" ENCODER TLN5731A	"VIBRASENDER" RESONANT REED TLN6824A	"PL" DECODER TRN6002A	"VIBRASPONDER" RESONANT REED TLN8381A	REMOTE CONTROL	REMOTE CONTROL CHASSIS TCN1107A	GUARD TONE DECODER MODULE TLN1245B	C2-R2 TONE CONTROL MODULE TLN1248A	STATION CONTROL MODULE TLN4635B	F1-"PL" TONE CONTROL MODULE TLN4638A	F1 TONE CONTROL MODULE TLN4658A	F1-"PL" DC TRANSFER MODULE TLN4659A	F2-R2 MUTE DC TRANSFER MODULE TLN4660A	F1-CS DC TRANSFER MODULE TLN4661A	C2-R2 DC TRANSFER MODULE TLN4663A	F2 TONE CONTROL MODULE TLN4665A	LINE DRIVER MODULE/2-WIRE 1-RECEIVER TLN4669B	LINE DRIVER MODULE/2-WIRE 2-RECEIVER TLN4670B
C53RTB-1105C							☒			☒					☒			☒	
C53RTB-1106C							☒	☒		☒		☒						☒	
C53RTB-1115C							☒			☒				☒				☒	
C53RTB-1116C							☒	☒		☒		☒					☒	☒	
C53RTB-1125C							☒			☒						☒		☒	
C53RTB-1126C							☒	☒	☒	☒		☒						☒	
C53RTB-1145C							☒			☒				☒					☒
C53RTB-1146C							☒	☒		☒		☒					☒		☒
C53RTB-3105C		☒	☒	☒	☒		☒			☒			☒					☒	
C53RTB-3106C		☒	☒	☒	☒		☒	☒		☒	☒							☒	
C53RTB-3115C		☒	☒	☒	☒		☒			☒				☒				☒	
C53RTB-3116C		☒	☒	☒	☒		☒	☒		☒	☒						☒	☒	
C53RTB-3125C		☒	☒	☒	☒		☒			☒						☒		☒	
C53RTB-3126C		☒	☒	☒	☒		☒	☒	☒	☒	☒							☒	
C53RTB-3145C		☒	☒	2	2		☒			☒				☒					☒
C53RTB-3146C		☒	☒	2	2		☒	☒		☒	☒						☒		☒
C63RTB-1105C							☒			☒					☒			☒	
C63RTB-1106C							☒	☒		☒		☒						☒	
C63RTB-1115C							☒			☒				☒				☒	
C63RTB-1116C							☒	☒		☒		☒					☒	☒	
C63RTB-1125C							☒			☒						☒		☒	
C63RTB-1126C							☒	☒	☒	☒		☒						☒	
C63RTB-1145C							☒			☒				☒					☒
C63RTB-1146C							☒	☒		☒		☒					☒		☒
C63RTB-3105C		☒	☒	☒	☒		☒			☒			☒					☒	
C63RTB-3106C		☒	☒	☒	☒		☒	☒		☒	☒							☒	
C63RTB-3115C		☒	☒	☒	☒		☒			☒				☒				☒	
C63RTB-3116C		☒	☒	☒	☒		☒	☒		☒	☒						☒	☒	
C63RTB-3125C		☒	☒	☒	☒		☒			☒						☒		☒	
C63RTB-3126C		☒	☒	☒	☒		☒	☒	☒	☒	☒							☒	
C63RTB-3145C		☒	☒	2	2		☒			☒				☒					☒
C63RTB-3146C		☒	☒	2	2		☒	☒		☒	☒						☒		☒
C73RTB-1105C							☒			☒					☒			☒	
C73RTB-1106C							☒	☒		☒		☒						☒	
C73RTB-1115C							☒			☒				☒				☒	
C73RTB-1116C							☒	☒		☒		☒					☒	☒	
C73RTB-1125C							☒			☒						☒		☒	
C73RTB-1126C							☒	☒	☒	☒		☒						☒	
C73RTB-1145C							☒			☒				☒					☒
C73RTB-1146C							☒	☒		☒		☒					☒		☒
C73RTB-3105C		☒	☒	☒	☒		☒			☒			☒					☒	
C73RTB-3106C		☒	☒	☒	☒		☒	☒		☒	☒							☒	
C73RTB-3115C		☒	☒	☒	☒		☒			☒				☒				☒	
C73RTB-3116C		☒	☒	☒	☒		☒	☒		☒	☒						☒	☒	
C73RTB-3125C		☒	☒	☒	☒		☒			☒						☒		☒	
C73RTB-3126C		☒	☒	☒	☒		☒	☒	☒	☒	☒							☒	
C73RTB-3145C		☒	☒	2	2		☒			☒				☒					☒
C73RTB-3146C		☒	☒	2	2		☒	☒		☒	☒						☒		☒

EPS-16865-D

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ITEM	DESCRIPTION	85	85	85	85	85	85	185	185	85	185	85	185	185	185	185	185																								
	TRANSMITTER																																								
*TLD1700B	POWER AMPLIFIER, 60-WATT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																								
*TLD1690B	POWER AMPLIFIER, 100-WATT																	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
*TLD1710B	EXCITER-DRIVER	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
KXN1019B	TRANSMITTER CHANNEL ELEMENT	X	X	2	2	2	2	2	2	X	X	2	2	2	2	2	2	X	X	2	2	2	2	2	2	X	X	2	2	2	2	2	2								
	RECEIVER																																								
*TRD1800BB	RECEIVER	X	X	X	X	X	X	2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	2	2								
K1005A	RECEIVER CHANNEL ELEMENT	X	X	X	X	2	2	0	0	X	X	X	X	2	2	0	0	X	X	X	X	2	2	0	0	X	X	X	X	2	2	0	0								
KXN1022A	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF)							0	0							0	0							0	0							0	0								
TLD8740A	SHIFTED IF KIT							0	0							0	0							0	0							0	0								
TLN4758A	2-RECEIVER COUPLER							X	X							X	X							X	X							X	X								
	MISCELLANEOUS																																								
TLN8799A	SERVICE BOARD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
TLN4295A	ANTENNA SWITCH	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
TLN4863A	HARDWARE, CABINET	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
THN6142A	CABINET	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
TPN1110B	POWER SUPPLY (FORMERLY TPN111-A)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
TKN6563A	STATION INTERCABLING (1-RECEIVER STATIONS)	X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X										
TKN6571A	STATION INTERCABLING (2-RECEIVER STATIONS)							X	X							X	X							X	X							X	X								
	"PRIVATE-LINE"																																								
TLN5731A	"PL" ENCODER									X	X	X	X	X	X	2	2									X	X	X	X	X	X	2	2								
TLN6824A	"VIBRASENDER" RESONANT REED									X	X	X	X	X	X	2	2									X	X	X	X	X	X	2	2								
TRN6002A	"PL" DECODER									X	X	X	X	X	X	2	2									X	X	X	X	X	X	2	2								
TLN8381A	"VIBRASPONDER" RESONANT REED									X	X	X	X	X	X	2	2									X	X	X	X	X	X	2	2								
	REMOTE CONTROL																																								
TCN1107A	REMOTE CONTROL CHASSIS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
TLN1245B	GUARD TONE DECODER MODULE		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X								
TLN1248A	C2-R2 TONE CONTROL MODULE						X																X																		
TLN4635B	STATION CONTROL MODULE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
TLN4638A	F1-"PL" TONE CONTROL MODULE										X		X		X		X										X		X		X		X								
TLN4658A	F1 TONE CONTROL MODULE		X		X		X		X										X		X		X		X																
TLN4659A	F1-"PL" DC TRANSFER MODULE									X																X															
TLN4660A	F2-R2 MUTE DC TRANSFER MODULE			X				X				X				X				X				X				X				X									
TLN4661A	F1 DC TRANSFER MODULE	X																X																							
TLN4663A	C2-R2 DC TRANSFER MODULE					X								X								X								X											
TLN4665A	F2 TONE CONTROL MODULE				X				X				X				X				X				X				X				X								
TLN4669B	LINE DRIVER MODULE 2-WIRE 1-RECEIVER	X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X										
TLN4670B	LINE DRIVER MODULE 2-WIRE 2-RECEIVER							X	X							X	X							X	X							X	X								

= CC3193
= CC3184

							X	X			X	X					X	X			X	X			X	X				TLN8381A	"VIBRASPONDER" RESONANT REED
																															REMOTE CONTROL
							X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X		TCN1107A	REMOTE CONTROL CHASSIS
							X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X		TLN8799A	SERVICE BOARD
							X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X		TLN4669A	LINE DRIVER MODULE 2-WIRE 1-RECEIVER
							X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X		TLN4662A	SQUELCH GATE MODULE
							X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X		TLN4635A	STATION CONTROL MODULE
										X				X						X				X			X	X		TLN4661A	F1 DC TRANSFER MODULE
								X				X						X				X				X				TLN4659A	F1-"PL" DC TRANSFER MODULE
									X				X						X				X				X			TLN4658A	F1 TONE CONTROL MODULE
							X				X						X				X				X					TLN4638A	F1-"PL" TONE CONTROL MODULE
							X		X		X		X				X		X		X		X		X		X			TLN1245B	GUARD TONE DECODER MODULE
							X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X		TLN4636A	TIME-OUT TIMER MODULE

RCB "C" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
BASE STATIONS-CONTINUOUS DUTY
CARRIER SQUELCH AND "PRIVATE-LINE" TONE-CODED SQUELCH
132-174 MHz
"C" SUFFIX MODELS

CODE:

☒ = ONE ITEM SUPPLIED

2 = TWO ITEMS SUPPLIED

0 = TWO K1005A RCVR ELEMENTS SUPPLIED UNLESS RECEIVER CARRIER FREQS. ARE SEPARATED BY 11.7 MHz ± 30 KHz (OR A SUBMULTIPLE THEREOF). IN THIS CASE, A K1005A CHANNEL ELEMENT IS USED IN THE FIRST RECEIVER AND A KXN1022A CHANNEL ELEMENT IS USED IN THE SECOND RECEIVER

* INDICATES A MODEL SERIES. SPECIFIC MODEL DEPENDS ON CARRIER FREQUENCY.

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER AND NUMBER COMBINATIONS.

C53RCB-1105C
5 = DC REMOTE CONTROL
6 - TONE REMOTE CONTROL
0 = T1-R1
1 = T2-R1
2 = T2-R2
4 = T2-2R (2 RECEIVER)
1 = CARRIER SQUELCH
3 = "PRIVATE-LINE" TONE-CODED SQUELCH
5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 = 100 W RF OUTPUT

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	T1 = ONE XMIT FREQ. T2 = TWO XMIT FREQS. R1 = ONE RCVR FREQ. R2 = TWO RCVR FREQS. 2R = TWO RCVRS - ONE FREQ. EACH	CONTROL TYPE	FCC LICENSE DESIGNATION	TRANSMITTER POWER AMPLIFIER, 60-WATT *TLD1700B	POWER AMPLIFIER, 100-WATT *TLD1690B	EXCITER-DRIVER *TLD1710B	TRANSMITTER CHANNEL ELEMENT KXN1019B	RECEIVER RECEIVER *TRD1800BB	RECEIVER CHANNEL ELEMENT K1005A	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF) KXN1022A	SHIFTED IF KIT TLD8740A	2-RECEIVER COUPLER TLN4758A	MISCELLANEOUS SERVICE BOARD TLN8799A	ANTENNA SWITCH TLN4295A	HARDWARE, CABINET TLN4863A	CABINET THN6142A	POWER SUPPLY (FORMERLY TPN1111-A) TPN1110B	STATION INTERCABLING (1-RECEIVER STATIONS) TKN6563A	STATION INTERCABLING (2-RECEIVER STATIONS) TKN6571A	"PRIVATE-LINE" "PL" ENCODER TLN5731A	"VIBRASENDER" RESONANT REED TLN6824A	"PL" DECODER TRN6002A	"VIBRASPONDER" RESONANT REED TLN8381A	REMOTE CONTROL REMOTE CONTROL CHASSIS TCN1107A	GUARD TONE DECODER MODULE TLN1245B	C2-R2 TONE CONTROL MODULE TLN1248A	STATION CONTROL MODULE TLN4635B	F1-"PL" TONE CONTROL MODULE TLN4638A	F1 TONE CONTROL MODULE TLN4658A	F1-"PL" DC TRANSFER MODULE TLN4659A	F2-R2 MUTE DC TRANSFER MODULE TLN4660A	F1 DC TRANSFER MODULE TLN4661A	C2-R2 DC TRANSFER MODULE TLN4663A	F2 TONE CONTROL MODULE TLN4665A	LINE DRIVER MODULE 2-WIRE 1-RECEIVER TLN4669B	LINE DRIVER MODULE 2-WIRE 2-RECEIVER TLN4670B
C53RCB-1105C	60	C.S.	T1-R1	DC	CC3185	☒		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒						☒			☒					☒			☒	
C53RCB-1106C	60	C.S.	T1-R1	TONE	CC3185	☒		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒						☒	
C53RCB-1115C	60	C.S.	T2-R1	DC	CC3185	☒		☒	2	☒	☒				☒	☒	☒	☒	☒	☒						☒			☒				☒				☒	
C53RCB-1116C	60	C.S.	T2-R1	TONE	CC3185	☒		☒	2	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒					☒	☒	
C53RCB-1125C	60	C.S.	T2-R2	DC	CC3185	☒		☒	2	☒	2				☒	☒	☒	☒	☒	☒						☒			☒						☒		☒	
C53RCB-1126C	60	C.S.	T2-R2	TONE	CC3185	☒		☒	2	☒	2				☒	☒	☒	☒	☒	☒						☒	☒	☒	☒		☒						☒	
C53RCB-1145C	60	C.S.	T2-2R	DC	CC3185	☒		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒					☒			☒				☒					☒
C53RCB-1146C	60	C.S.	T2-2R	TONE	CC3185	☒		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒					☒	☒		☒		☒					☒		☒
C53RCB-3105C	60	"PL"	T1-R1	DC	CC3185	☒		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒			☒					☒	
C53RCB-3106C	60	"PL"	T1-R1	TONE	CC3185	☒		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒							☒	
C53RCB-3115C	60	"PL"	T2-R1	DC	CC3185	☒		☒	2	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒				☒				☒	
C53RCB-3116C	60	"PL"	T2-R1	TONE	CC3185	☒		☒	2	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒						☒	☒	
C53RCB-3125C	60	"PL"	T2-R2	DC	CC3185	☒		☒	2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒						☒		☒	
C53RCB-3126C	60	"PL"	T2-R2	TONE	CC3185	☒		☒	2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒							☒	
C53RCB-3145C	60	"PL"	T2-2R	DC	CC3185	☒		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒	2	2	2	2	☒			☒				☒					☒
C53RCB-3146C	60	"PL"	T2-2R	TONE	CC3185	☒		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒	2	2	2	2	☒	☒		☒	☒						☒		☒
C63/C73RCB-1105C	△	C.S.	T1-R1	DC	△ △		☒	☒	☒	☒	☒				☒	☒	☒	☒	☒	☒						☒			☒					☒			☒	
C63/C73RCB-1106C	△	C.S.	T1-R1	TONE	△ △		☒	☒	☒	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒						☒	
C63/C73RCB-1115C	△	C.S.	T2-R1	DC	△ △		☒	☒	2	☒	☒				☒	☒	☒	☒	☒	☒						☒			☒				☒				☒	
C63/C73RCB-1116C	△	C.S.	T2-R1	TONE	△ △		☒	☒	2	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒					☒	☒	
C63/C73RCB-1125C	△	C.S.	T2-R2	DC	△ △		☒	☒	2	☒	2				☒	☒	☒	☒	☒	☒						☒			☒						☒		☒	
C63/C73RCB-1126C	△	C.S.	T2-R2	TONE	△ △		☒	☒	2	☒	2				☒	☒	☒	☒	☒	☒						☒	☒	☒	☒		☒						☒	
C63/C73RCB-1145C	△	C.S.	T2-2R	DC	△ △		☒	☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒					☒			☒				☒					☒
C63/C73RCB-1146C	△	C.S.	T2-2R	TONE	△ △		☒	☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒					☒	☒		☒		☒					☒		☒
C63/C73RCB-3105C	△	"PL"	T1-R1	DC	△ △		☒	☒	☒	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒			☒					☒	
C63/C73RCB-3106C	△	"PL"	T1-R1	TONE	△ △		☒	☒	☒	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒							☒	
C63/C73RCB-3115C	△	"PL"	T2-R1	DC	△ △		☒	☒	2	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒				☒				☒	
C63/C73RCB-3116C	△	"PL"	T2-R1	TONE	△ △		☒	☒	2	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒						☒	☒	
C63/C73RCB-3125C	△	"PL"	T2-R2	DC	△ △		☒	☒	2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒						☒		☒	
C63/C73RCB-3126C	△	"PL"	T2-R2	TONE	△ △		☒	☒	2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒							☒	
C63/C73RCB-3145C	△	"PL"	T2-2R	DC	△ △		☒	☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒	2	2	2	2	☒			☒				☒					☒
C63/C73RCB-3146C	△	"PL"	T2-2R	TONE	△ △		☒	☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒	2	2	2	2	☒	☒		☒	☒						☒		☒

△ C63 SERIES = 90 W
C73 SERIES = 100 W

△ △C63 SERIES = CC3193
C73 SERIES = CC3184

EPS-16866-D

RCB "BT" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
REPEATER (RT) STATIONS
CONTINUOUS & INTERMITTENT DUTY
"BT" SUFFIX MODELS
132-174 MHz

CODE:

☒ = ONE ITEM SUPPLIED

0 = DUPLEXER UNIT SUPPLIED ONLY WHEN USED ABOVE 148 MHz AND TRANSMIT-RECEIVE FREQUENCIES ARE SEPARATED BY 1.5 MHz OR GREATER.

* INDICATES A MODEL SERIES. SPECIFIC MODEL DEPENDS ON CARRIER FREQUENCY. (NOTE: 60-WATT STATIONS AVAILABLE ONLY FOR 150.8-174 MHz.)

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER & NUMBER COMBINATIONS.

C53RCB-1105BT
5= DC REMOTE CONTROL
6= TONE REMOTE CONTROL
1= CARRIER SQUELCH
3= "PRIVATE-LINE" TONE-CODED SQUELCH
C= CONTINUOUS DUTY
T= INTERMITTENT DUTY
5= 60 W RF OUTPUT
6= 90 W RF OUTPUT
7= 100 W RF OUTPUT WITH CONTINUOUS DUTY STATIONS
110 W RF OUTPUT WITH INTERMITTENT DUTY

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	CONTROL TYPE	FCC LICENSE DESIGNATION	TRANSMITTER						RECEIVER			MISCELLANEOUS							
				DESCRIPTION	POWER AMPLIFIER, 60-WATT CONTINUOUS DUTY	POWER AMPLIFIER, 100-WATT CONTINUOUS DUTY	EXCITER-DRIVER (CONTINUOUS DUTY STATIONS)	SHIELD AND FILTER, TRANSMITTER	CHANNEL ELEMENT, TRANSMITTER	TRANSMITTER, 90/110-WATT INTERMITTENT DUTY	RECEIVER	CHANNEL ELEMENT, RECEIVER	SHIELD AND FILTER, RECEIVER	DUPLEXER	POWER SUPPLY (FORMERLY TPN1110A)	STATION INTERCABLING (CONTINUOUS DUTY STATIONS)	STATION INTERCABLING (INTERMITTENT DUTY STATIONS)	HARDWARE, CABINET (CONTINUOUS DUTY STATIONS)	HARDWARE, CABINET (INTERMITTENT DUTY STATIONS)	CABINET (CONTINUOUS DUTY STATIONS)	CABINET (INTERMITTENT DUTY STATIONS)
				ITEM	*TLD1700A	*TLD1690A	*TLD1710A	TLN1434A	KNX1019A	*TTD1690AA	*TRD1800AB	K1005A	TLN1435A	T1487AF	TPN1110B	TKN6617A	TKN6616A	TLN4861A	TLN4859A	THN6142A	THN6141A
CONTINUOUS DUTY STATIONS																					
C53RCB-1105BT	60	CARRIER	DC	CC3185	X		X	X	X		X	X	X	0	X	X		X		X	
C53RCB-1106BT	60	CARRIER	TONE	CC3185	X		X	X	X		X	X	X	0	X	X		X		X	
C53RCB-3105BT	60	TONE-CODED	DC	CC3185	X		X	X	X		X	X	X	0	X	X		X		X	
C53RCB-3106BT	60	TONE-CODED	TONE	CC3185	X		X	X	X		X	X	X	0	X	X		X		X	
C63RCB-1105BT	90	CARRIER	DC	CC3193		X	X	X	X		X	X	X	0	X	X		X		X	
C63RCB-1106BT	90	CARRIER	TONE	CC3193		X	X	X	X		X	X	X	0	X	X		X		X	
C63RCB-3105BT	90	TONE-CODED	DC	CC3193		X	X	X	X		X	X	X	0	X	X		X		X	
C63RCB-3106BT	90	TONE-CODED	TONE	CC3193		X	X	X	X		X	X	X	0	X	X		X		X	
C73RCB-1105BT	100	CARRIER	DC	CC3184		X	X	X	X		X	X	X	0	X	X		X		X	
C73RCB-1106BT	100	CARRIER	TONE	CC3184		X	X	X	X		X	X	X	0	X	X		X		X	
C73RCB-3105BT	100	TONE-CODED	DC	CC3184		X	X	X	X		X	X	X	0	X	X		X		X	
C73RCB-3106BT	100	TONE-CODED	TONE	CC3184		X	X	X	X		X	X	X	0	X	X		X		X	
INTERMITTENT DUTY STATIONS																					
C63RTB-1105BT	90	CARRIER	DC	CC3182				X	X	X	X	X	X	0	X		X		X		X
C63RTB-1106BT	90	CARRIER	TONE	CC3182				X	X	X	X	X	X	0	X		X		X		X
C63RTB-3105BT	90	TONE-CODED	DC	CC3182				X	X	X	X	X	X	0	X		X		X		X
C63RTB-3106BT	90	TONE-CODED	TONE	CC3182				X	X	X	X	X	X	0	X		X		X		X
C73RTB-1105BT	110	CARRIER	DC	CC3183				X	X	X	X	X	X	0	X		X		X		X
C73RTB-1106BT	110	CARRIER	TONE	CC3183				X	X	X	X	X	X	0	X		X		X		X
C73RTB-3105BT	110	TONE-CODED	DC	CC3183				X	X	X	X	X	X	0	X		X		X		X
C73RTB-3106BT	110	TONE-CODED	TONE	CC3183				X	X	X	X	X	X	0	X		X		X		X

STATION MODEL	"PRIVATE-LINE"				REMOTE CONTROL										
DESCRIPTION	"PL" ENCODER	"PL" DECODER	"VIBRASENDER" RESONANT REED	"VIBRASPONDER" RESONANT REED	REMOTE CONTROL CHASSIS	SERVICE BOARD	LINE DRIVER MODULE 2-WIRE 1-RECEIVER	SQUELCH GATE MODULE	STATION CONTROL MODULE	F1 DC TRANSFER MODULE	F1-"PL" DC TRANSFER MODULE	F1 TONE CONTROL MODULE	F1 "PL" TONE CONTROL MODULE	GUARD TONE DECODER MODULE	TIME-OUT TIMER MODULE
ITEM	TLN4293B	TLN4294B	TLN6824A	TLN8381A	TCN1107A	TLN8799A	TLN4669A	TLN4662A	TLN4635A	TLN4661A	TLN4659A	TLN4658A	TLN4638A	TLN1245B	TLN4636A
CONTINUOUS DUTY STATIONS															
C53RCB-1105BT					X	X	X	X	X	X					X
C53RCB-1106BT					X	X	X	X	X			X		X	X
C53RCB-3105BT	X	X	X	X	X	X	X	X	X		X				X
C53RCB-3106BT	X	X	X	X	X	X	X	X	X				X	X	X
C63RCB-1105BT					X	X	X	X	X	X					X
C63RCB-1106BT					X	X	X	X	X			X		X	X
C63RCB-3105BT	X	X	X	X	X	X	X	X	X		X				X
C63RCB-3106BT	X	X	X	X	X	X	X	X	X				X	X	X
C73RCB-1105BT					X	X	X	X	X	X					X
C73RCB-1106BT					X	X	X	X	X			X		X	X
C73RCB-3105BT	X	X	X	X	X	X	X	X	X		X				X
C73RCB-3106BT	X	X	X	X	X	X	X	X	X				X	X	X
INTERMITTENT DUTY STATIONS															
C63RTB-1105BT					X	X	X	X	X	X					X
C63RTB-1106BT					X	X	X	X	X			X		X	X
C63RTB-3105BT	X	X	X	X	X	X	X	X	X		X				X
C63RTB-3106BT	X	X	X	X	X	X	X	X	X				X	X	X
C73RTB-1105BT					X	X	X	X	X	X					X
C73RTB-1106BT					X	X	X	X	X			X		X	X
C73RTB-3105BT	X	X	X	X	X	X	X	X	X		X				X
C73RTB-3106BT	X	X	X	X	X	X	X	X	X				X	X	X

EPS-13238-D

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DESCRIPTION	TRANSMITTER			RECEIVER					MISCELLANEOUS							"PRIVATE-LINE"				REMOTE CONTROL												
	TRANSMITTER 60 W	TRANSMITTER 90-110 W	TRANSMITTER CHANNEL ELEMENT	RECEIVER	RECEIVER CHANNEL ELEMENT	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF)	SHIFTED IF KIT	2-RECEIVER COUPLER	SERVICE BOARD	ANTENNA SWITCH	HARDWARE, CABINET	CABINET	POWER SUPPLY (FORMERLY TPN1110A)	STATION INTERCABLING (1-RECEIVER STATIONS)	STATION INTERCABLING (2-RECEIVER STATIONS)	"PL" ENCODER	"VIBRASENDER" RESONANT REED	"PL" DECODER	"VIBRASPONDER" RESONANT REED	REMOTE CONTROL CHASSIS	GUARD TONE DECODER MODULE	C2-R2 TONE CONTROL MODULE	STATION CONTROL MODULE	F1-"PL" TONE CONTROL MODULE	F1 TONE CONTROL MODULE	F1-"PL" DC TRANSFER MODULE	F2-R2 MUTE DC TRANSFER MODULE	F1-CS DC TRANSFER MODULE	C2-R2 DC TRANSFER MODULE	F2 TONE CONTROL MODULE	LINE DRIVER MODULE/2-WIRE 1-RECEIVER	LINE DRIVER MODULE/2-WIRE 2-RECEIVER
MODEL FCC LICENSE DESIGNATION	*TTD1700A	*TTD1690AA	KXN1019A	*TRD1800AB	K1005A	KXN1022A	TLD8740A	TLN4758A	TLN8799A	TLN4295A	TLN4735A	THN6141A	TPN1110B	TKN6561A	TKN6562A	TLN4293B	TLN6824A	TLN4294B	TLN8381A	TCN1107A	TLN1245B	TLN1248A	TLN4635A	TLN4638A	TLN4658A	TLN4659A	TLN4660A	TLN4661A	TLN4663A	TLN4665A	TLN4669A	TLN4670A
CC3181	X		X	X	X				X	X	X	X	X	X						X			X					X			X	
CC3181	X		X	X	X				X	X	X	X	X	X						X	X		X		X						X	
CC3181	X		2	X	X				X	X	X	X	X	X						X			X				X				X	
CC3181	X		2	X	X				X	X	X	X	X	X						X	X		X		X					X	X	
CC3181	X		2	X	2				X	X	X	X	X	X						X			X						X		X	
CC3181	X		2	X	2				X	X	X	X	X	X						X	X	X	X		X						X	
CC3181	X		2	2	0	0	0	X	X	X	X	X	X		X					X			X				X					X
CC3181	X		2	2	0	0	0	X	X	X	X	X	X		X					X	X		X		X					X		X
CC3181	X		X	X	X				X	X	X	X	X	X		X	X	X	X	X			X			X					X	
CC3181	X		X	X	X				X	X	X	X	X	X		X	X	X	X	X	X		X	X							X	
CC3181	X		2	X	X				X	X	X	X	X	X		X	X	X	X	X			X				X				X	
CC3181	X		2	X	X				X	X	X	X	X	X		X	X	X	X	X	X		X	X						X	X	
CC3181	X		2	X	2				X	X	X	X	X	X		X	X	X	X	X			X						X		X	
CC3181	X		2	X	2				X	X	X	X	X	X		X	X	X	X	X	X	X	X	X							X	
CC3181	X		2	2	0	0	0	X	X	X	X	X	X		X	X	X	2	2	X			X				X					X
CC3181	X		2	2	0	0	0	X	X	X	X	X	X		X	X	X	2	2	X	X		X	X						X		X
CC3182		X	X	X	X				X	X	X	X	X	X						X			X					X			X	
CC3182		X	X	X	X				X	X	X	X	X	X						X	X		X		X						X	
CC3182		X	2	X	X				X	X	X	X	X	X						X			X				X				X	
CC3182		X	2	X	X				X	X	X	X	X	X						X	X		X		X					X	X	
CC3182		X	2	X	2				X	X	X	X	X	X						X			X						X		X	
CC3182		X	2	X	2				X	X	X	X	X	X						X	X	X	X		X						X	
CC3182		X	2	2	0	0	0	X	X	X	X	X	X		X					X			X				X					X
CC3182		X	2	2	0	0	0	X	X	X	X	X	X		X					X	X		X		X					X		X
CC3182		X	X	X	X				X	X	X	X	X	X		X	X	X	X	X			X			X					X	
CC3182		X	X	X	X				X	X	X	X	X	X		X	X	X	X	X	X		X	X							X	
CC3182		X	2	X	X				X	X	X	X	X	X		X	X	X	X	X			X				X				X	
CC3182		X	2	X	X				X	X	X	X	X	X		X	X	X	X	X	X		X	X						X	X	
CC3182		X	2	X	2				X	X	X	X	X	X		X	X	X	X	X			X						X		X	
CC3182		X	2	X	2				X	X	X	X	X	X		X	X	X	X	X	X	X	X	X							X	
CC3182		X	2	2	0	0	0	X	X	X	X	X	X		X	X	X	2	2	X			X				X					X
CC3182		X	2	2	0	0	0	X	X	X	X	X	X		X	X	X	2	2	X	X		X	X						X		X
CC3183		X	X	X	X				X	X	X	X	X	X						X			X					X			X	
CC3183		X	X	X	X				X	X	X	X	X	X						X	X		X		X						X	
CC3183		X	2	X	X				X	X	X	X	X	X						X			X				X				X	
CC3183		X	2	X	X				X	X	X	X	X	X						X	X		X		X					X	X	
CC3183		X	2	X	2				X	X	X	X	X	X						X			X						X		X	
CC3183		X	2	X	2				X	X	X	X	X	X						X	X	X	X		X						X	
CC3183		X	2	2	0	0	0	X	X	X	X	X	X		X					X			X				X					X
CC3183		X	2	2	0	0	0	X	X	X	X	X	X		X					X	X		X		X					X		X
CC3183		X	X	X	X				X	X	X	X	X	X		X	X	X	X	X			X			X					X	
CC3183		X	X	X	X				X	X	X	X	X	X		X	X	X	X	X	X		X	X							X	
CC3183		X	2	X	X				X	X	X	X	X	X		X	X	X	X	X			X				X				X	
CC3183		X	2	X	X				X	X	X	X	X	X		X	X	X	X	X	X		X	X						X	X	
CC3183		X	2	X	2				X	X	X	X	X	X		X	X	X	X	X			X						X		X	
CC3183		X	2	X	2				X	X	X	X	X	X		X	X	X	X	X	X	X	X	X							X	
CC3183		X	2	2	0	0	0	X	X	X	X	X	X		X	X	X	2	2	X			X				X					X
CC3183		X	2	2	0	0	0	X	X	X	X	X	X		X	X	X	2	2	X	X		X	X						X		X

			X	X	X	X		X	X	X	X	X	X		TLN4662A	SQUELCH GATE MODULE
			X	X	X	X		X	X	X	X	X	X		TLN4635B	STATION CONTROL MODULE
				X		X			X		X		X		TLN4659A	F1-"PL" DC TRANSFER MODULE
			X		X			X		X		X			TLN4638A	F1-"PL" TONE CONTROL MODULE
			X		X			X		X		X			TLN1245B	GUARD TONE DECODER MODULE
			X	X	X	X		X	X	X	X	X	X		TLN4636A	TIME-OUT TIMER MODULE

-18077-C

"B" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
BASE STATIONS-INTERMITTENT DUTY
"B" SUFFIX MODELS
132-174 MHz

CODE:

☒ = ONE ITEM SUPPLIED

2 = TWO ITEMS SUPPLIED

0 = TWO K1005A RCVR ELEMENTS SUPPLIED UNLESS RECEIVER CARRIER FREQS. ARE SEPARATED BY 11.7 MHz ±30 kHz (OR A SUB-MULTIPLE THEREOF). IN THIS CASE A K1005A CHANNEL ELEMENT IS USED IN FIRST RECEIVER AND A KXN1022A CHANNEL ELEMENT IS USED IN SECOND RECEIVER. THE IF OF THE SECOND RECEIVER IS SHIFTED.

* INDICATES A SERIES OF MODELS. SPECIFIC MODEL DEPENDS UPON CARRIER FREQUENCY.

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER AND NUMBER COMBINATIONS.

C53RTB-1105B

5 = DC REMOTE CONTROL
6 = TONE REMOTE CONTROL

0 = T1-R1
1 = T2-R1
2 = T2-R2
4 = T2-2R (2 RECEIVERS)

1 = CARRIER SQUELCH
3 = "PRIVATE-LINE" TONE-CODED SQUELCH

5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 = 110 W RF OUTPUT

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	T1 = ONE XMIT FREQ. T2 = TWO XMIT FREQS. R1 = ONE RCVR FREQ. R2 = TWO RCVR FREQS. 2R = TWO RCVRS - ONE FREQ. EACH	CONTROL TYPE	FCC LICENSE DESIGNATION	TRANSMITTER			RECEIVER					MISCELLANEOUS							"PRIVATE-LINE"				REMOTE CONTROL												
					DESCRIPTION	TRANSMITTER 60 W	TRANSMITTER 90-110 W	TRANSMITTER CHANNEL ELEMENT	RECEIVER	RECEIVER CHANNEL ELEMENT	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF)	SHIFTED IF KIT	2-RECEIVER COUPLER	SERVICE BOARD	ANTENNA SWITCH	HARDWARE, CABINET	CABINET	POWER SUPPLY (FORMERLY TPN1110A)	STATION INTERCABLING (1-RECEIVER STATIONS)	STATION INTERCABLING (2-RECEIVER STATIONS)	"PL" ENCODER	"VIBRASENDER" RESONANT REED	"PL" DECODER	"VIBRASPONDER" RESONANT REED	REMOTE CONTROL CHASSIS	GUARD TONE DECODER MODULE	C2-R2 TONE CONTROL MODULE	STATION CONTROL MODULE	F1-"PL" TONE CONTROL MODULE	F1 TONE CONTROL MODULE	F1-"PL" DC TRANSFER MODULE	F2-R2 MUTE DC TRANSFER MODULE	F1-CS DC TRANSFER MODULE	C2-R2 DC TRANSFER MODULE	F2 TONE CONTROL MODULE	LINE DRIVER MODULE/2-WIRE 1-RECEIVER	LINE DRIVER MODULE/2-WIRE 2-RECEIVER
					MODEL	*TTD1700A	*TTD1690AA	KXN1019A	*TRD1800AB	K1005A	KXN1022A	TLD8740A	TLN4758A	TLN8799A	TLN4295A	TLN4735A	THN6141A	TPN1110B	TKN6561A	TKN6562A	TLN4293B	TLN6824A	TLN4294B	TLN8381A	TCN1107A	TLN1245B	TLN1248A	TLN4635A	TLN4638A	TLN4658A	TLN4659A	TLN4660A	TLN4661A	TLN4663A	TLN4665A	TLN4669A	TLN4670A
C53RTB-1105B	60	CARRIER	T1-R1	DC	CC3181	☒		☒	☒	☒				☒	☒	☒	☒	☒	☒						☒			☒					☒			☒	
C53RTB-1106B	60	CARRIER	T1-R1	TONE	CC3181	☒		☒	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒						☒	
C53RTB-1115B	60	CARRIER	T2-R1	DC	CC3181	☒		2	☒	☒				☒	☒	☒	☒	☒	☒						☒			☒				☒				☒	
C53RTB-1116B	60	CARRIER	T2-R1	TONE	CC3181	☒		2	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒					☒	☒	
C53RTB-1125B	60	CARRIER	T2-R2	DC	CC3181	☒		2	☒	2				☒	☒	☒	☒	☒	☒						☒			☒						☒		☒	
C53RTB-1126B	60	CARRIER	T2-R2	TONE	CC3181	☒		2	☒	2				☒	☒	☒	☒	☒	☒						☒	☒	☒	☒		☒						☒	
C53RTB-1145B	60	CARRIER	T2-2R	DC	CC3181	☒		2	2	0	0	0	☒	☒	☒	☒	☒	☒	☒	☒					☒			☒				☒					☒
C53RTB-1146B	60	CARRIER	T2-2R	TONE	CC3181	☒		2	2	0	0	0	☒	☒	☒	☒	☒	☒	☒	☒					☒	☒		☒		☒					☒		☒
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C53RTB-3116B	60	"PL"	T2-R1	TONE	CC3181	☒		2	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒						☒	☒	
C53RTB-3125B	60	"PL"	T2-R2	DC	CC3181	☒		2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒						☒		☒	
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C53RTB-3146B	60	"PL"	T2-2R	TONE	CC3181	☒		2	2	0	0	0	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	2	2	☒	☒		☒	☒						☒		☒
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C63RTB-3126B	90	"PL"	T2-R2	TONE	CC3182		☒	2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒	☒	☒	☒							☒	
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C73RTB-1106B	110	CARRIER	T1-R1	TONE	CC3183		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒						☒	
C73RTB-1115B	110	CARRIER	T2-R1	DC	CC3183		☒	2	☒	☒				☒	☒	☒	☒	☒	☒						☒			☒				☒				☒	
C73RTB-1116B	110	CARRIER	T2-R1	TONE	CC3183		☒	2	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒					☒	☒	
C73RTB-1125B	110	CARRIER	T2-R2	DC	CC3183		☒	2	☒	2				☒	☒	☒	☒	☒	☒						☒			☒						☒		☒	
C73RTB-1126B	110	CARRIER	T2-R2	TONE	CC3183		☒	2	☒	2				☒	☒	☒	☒	☒	☒						☒	☒	☒	☒		☒						☒	
C73RTB-1145B	110	CARRIER	T2-2R	DC	CC3183		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒	☒	☒					☒			☒				☒					☒
C73RTB-1146B	110	CARRIER	T2-2R	TONE	CC3183		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒	☒	☒					☒	☒		☒		☒					☒		☒
C73RTB-3105B	110	"PL"	T1-R1	DC	CC3183		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒			☒					☒	
C73RTB-3106B	110	"PL"	T1-R1	TONE	CC3183		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒							☒	
C73RTB-3115B	110	"PL"	T2-R1	DC	CC3183		☒	2	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒				☒				☒	
C73RTB-3116B	110	"PL"	T2-R1	TONE	CC3183		☒	2	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒						☒	☒	
C73RTB-3125B	110	"PL"	T2-R2	DC	CC3183		☒	2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒						☒		☒	
C73RTB-3126B	110	"PL"	T2-R2	TONE	CC3183		☒	2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒	☒	☒	☒							☒	
C73RTB-3145B	110	"PL"	T2-2R	DC	CC3183		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	2	2	☒			☒				☒					☒
C73RTB-3146B	110	"PL"	T2-2R	TONE	CC3183		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	2	2	☒	☒		☒	☒						☒		☒

EPS-13239-D

RCB "AT" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR"® "COMPA-STATION"®
REPEATER (RT) STATIONS
CONTINUOUS & INTERMITTENT DUTY
"DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH
132-174 MHz

CODE:

☒ = ONE ITEM SUPPLIED

0 = DUPLEXER UNIT SUPPLIED ONLY WHEN USED ABOVE 148 MHz AND TRANSMIT-RECEIVE FREQUENCIES ARE SEPARATED BY 1.5 MHz OR GREATER.

* = INDICATES A MODEL SERIES. SPECIFIC MODEL DEPENDS ON CARRIER FREQUENCY. (NOTE: 60-WATT STATIONS AVAILABLE ONLY FOR 150.8-174 MHz)

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER & NUMBER COMBINATIONS.

C53RCB-1105AT

5 = DC REMOTE CONTROL
6 = TONE REMOTE CONTROL

6 = "DIGITAL PRIVATE-LINE" SQUELCH

C = CONTINUOUS DUTY
T = INTERMITTENT DUTY

5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 = 100 W RF OUTPUT WITH CONTINUOUS DUTY STATIONS
110 W RF OUTPUT WITH INTERMITTENT DUTY

DESCRIPTION		ITEM
TRANSMITTER	POWER AMPLIFIER, 60-WATT CONTINUOUS DUTY	*TLD1700A
	POWER AMPLIFIER, 100-WATT CONTINUOUS DUTY	*TLD1690A
	EXCITER-DRIVER (CONTINUOUS DUTY STATIONS)	*TLD1710B
	SHIELD AND FILTER, TRANSMITTER	TLN1434A
	CHANNEL ELEMENT, TRANSMITTER	KXN1019B
	TRANSMITTER, 90/110-WATT INTERMITTENT DUTY	*TTD1690BA
RECEIVER	RECEIVER	*TRD1800BB
	CHANNEL ELEMENT, RECEIVER	K1005A
	SHIELD AND FILTER, RECEIVER	TLN1435B
MISCELLANEOUS	DUPLEXER	T1487AF
	POWER SUPPLY (FORMERLY TPN1110A)	TPN1110B
	STATION INTERCABLING (CONTINUOUS DUTY STATIONS)	TKN6617A
	STATIONS INTERCABLING (INTERMITTENT DUTY STATIONS)	TKN6616A
	HARDWARE, CABINET (CONTINUOUS DUTY STATIONS)	TLN4861A
	HARDWARE, CABINET (INTERMITTENT DUTY STATIONS)	TLN4859A
	CABINET (CONTINUOUS DUTY STATIONS)	THN6142A
	CABINET (INTERMITTENT DUTY STATIONS)	THN6141A
"DIGITAL PRIVATE-LINE"	"DIGITAL PRIVATE-LINE" ENCODER	TTN6003A
	CODE PLUG	TRN6005A
	"DIGITAL PRIVATE-LINE" DECODER	TLN5729A
	"DIGITAL PRIVATE-LINE" ENCODER	TLN5725A
REMOTE CONTROL	REMOTE CONTROL CHASSIS	TCN1107A
	SERVICE BOARD	TLN8799A
	LINE DRIVER MODULE 2-WIRE 1-RECEIVER	TLN4669A
	SQUELCH GATE MODULE	TLN4662A
	STATION CONTROL MODULE	TLN4635B
	F1-"PL" DC TRANSFER MODULE	TLN4659A
	F1-"PL" TONE CONTROL MODULE	TLN4638A
	GUARD TONE DECODER MODULE	TLN1245B
	TIME-OUT TIMER MODULE	TLN4636A

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	CONTROL TYPE	FCC LICENSE DESIGNATION	*TLD1700A	*TLD1690A	*TLD1710B	TLN1434A	KXN1019B	*TTD1690BA	*TRD1800BB	K1005A	TLN1435B	T1487AF	TPN1110B	TKN6617A	TKN6616A	TLN4861A	TLN4859A	THN6142A	THN6141A	TTN6003A	TRN6005A	TLN5729A	TLN5725A	TCN1107A	TLN8799A	TLN4669A	TLN4662A	TLN4635B	TLN4659A	TLN4638A	TLN1245B	TLN4636A
CONTINUOUS DUTY STATIONS																																		
C53RCB-6105AT	60	"DPL"	DC	CC3185	X		X	X	X		X	X	X	0	X	X		X		X			2	X	X	X	X	X	X	X	X			X
C53RCB-6106AT	60	"DPL"	TONE	CC3185	X		X	X	X		X	X	X	0	X	X		X		X			2	X	X	X	X	X	X	X		X	X	X
C63RCB-6105AT	90	"DPL"	DC	CC3193		X	X	X	X		X	X	X	0	X	X		X		X			2	X	X	X	X	X	X	X	X			X
C63RCB-6106AT	90	"DPL"	TONE	CC3193		X	X	X	X		X	X	X	0	X	X		X		X			2	X	X	X	X	X	X	X		X	X	X
C73RCB-6105AT	100	"DPL"	DC	CC3184		X	X	X	X		X	X	X	0	X	X		X		X			2	X	X	X	X	X	X	X	X			X
C73RCB-6106AT	100	"DPL"	TONE	CC3184		X	X	X	X		X	X	X	0	X	X		X		X			2	X	X	X	X	X	X	X		X	X	X
INTERMITTENT DUTY STATIONS																																		
C63RTB-6105AT	90	"DPL"	DC	CC3182				X	X	X	X	X	X	0	X		X		X		X		2	X	X	X	X	X	X	X	X			X
C63RTB-6106AT	90	"DPL"	TONE	CC3182				X	X	X	X	X	X	0	X		X		X		X		2	X	X	X	X	X	X	X		X	X	X
C73RTB-6105AT	110	"DPL"	DC	CC3183				X	X	X	X	X	X	0	X		X		X		X		2	X	X	X	X	X	X	X	X			X
C73RTB-6106AT	110	"DPL"	TONE	CC3183				X	X	X	X	X	X	0	X		X		X		X		2	X	X	X	X	X	X	X		X	X	X

EPS-18077-C

NDS
S

TY STATIONS
DUTY

ITEM

DESCRIPTION

OL E	FCC LICENSE DESIGNATION	TRANSMITTER	*TLD1700A POWER AMPLIFIER, 60-WATT CONTINUOUS DUTY	*TLD1690A POWER AMPLIFIER, 100-WATT CONTINUOUS DUTY	*TLD1710A EXCITER-DRIVER (CONTINUOUS DUTY STATIONS)	TLN1434A SHIELD AND FILTER, TRANSMITTER	KNX1019A CHANNEL ELEMENT, TRANSMITTER	*TTD1690AA TRANSMITTER, 90/110-WATT INTERMITTENT DUTY	RECEIVER	*TRD1800AB RECEIVER	K1005A CHANNEL ELEMENT, RECEIVER	TLN1435A SHIELD AND FILTER, RECEIVER	MISCELLANEOUS	T1487AF DUPLEXER	TPN1095A POWER SUPPLY, 60-WATT CONTINUOUS DUTY AND 90/110-WATT INTERMITTENT DUTY	TPN1096A POWER SUPPLY, 90/100-WATT CONTINUOUS DUTY	TKN6617A STATION INTERCABLING (CONTINUOUS DUTY STATIONS)	TKN6616A STATION INTERCABLING (INTERMITTENT DUTY STATIONS)	TLN4861A HARDWARE, CABINET (CONTINUOUS DUTY STATIONS)	TLN4859A HARDWARE, CABINET (INTERMITTENT DUTY STATIONS)	THN6142A CABINET (CONTINUOUS DUTY STATIONS)	THN6141A CABINET (INTERMITTENT DUTY STATIONS)	"PRIVATE-LINE"	TLN4293B "PL" ENCODER	TLN4294B "PL" DECODER	TLN6824A "VIBRASENDER" RESONANT REED	TLN8381A "VIBRASPONDER" RESONANT REED	REMOTE CONTROL	TCN1107A REMOTE CONTROL CHASSIS	TLN8799A SERVICE BOARD	TLN4669A LINE DRIVER MODULE 2-WIRE 1-RECEIVER	TLN4662A SQUELCH GATE MODULE	TLN4635A STATION CONTROL MODULE	TLN4661A F1 DC TRANSFER MODULE	TLN4659A F1-"PL" DC TRANSFER MODULE	TLN4658A F1 TONE CONTROL MODULE	TLN4638A F1-"PL" TONE CONTROL MODULE	TLN1245B GUARD TONE DECODER MODULE	TLN4636A TIME-OUT TIMER MODULE		
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	CC3182					☒	☒	☒		☒	☒	☒		O	☒			☒		☒		☒							☒	☒	☒	☒	☒	☒					☒		
	CC3182					☒	☒	☒		☒	☒	☒		O	☒			☒		☒		☒							☒	☒	☒	☒	☒			☒		☒	☒		
	CC3182					☒	☒	☒		☒	☒	☒		O	☒			☒		☒		☒		☒	☒	☒	☒		☒	☒	☒	☒	☒		☒				☒		
	CC3182					☒	☒	☒		☒	☒	☒		O	☒			☒		☒		☒		☒	☒	☒	☒		☒	☒	☒	☒	☒				☒	☒	☒		
	CC3183					☒	☒	☒		☒	☒	☒		O	☒			☒		☒		☒							☒	☒	☒	☒	☒	☒					☒		
	CC3183					☒	☒	☒		☒	☒	☒		O	☒			☒		☒		☒							☒	☒	☒	☒	☒			☒		☒	☒		
	CC3183					☒	☒	☒		☒	☒	☒		O	☒			☒		☒		☒		☒	☒	☒	☒		☒	☒	☒	☒	☒		☒				☒		
	CC3183					☒	☒	☒		☒	☒	☒		O	☒			☒		☒		☒		☒	☒	☒	☒		☒	☒	☒	☒	☒				☒	☒	☒		

ST	"PRIVATE-LINE"				REMOTE CONTROL												
	TLN4293B "PL" ENCODER	TLN6824A "VIBRASENDER" RESONANT REED	TLN4294B "PL" DECODER	TLN8381A "VIBRASPONDER" RESONANT REED	TCN1107A REMOTE CONTROL CHASSIS	TLN1245B GUARD TONE DECODER MODULE	TLN1248A C2-R2 TONE CONTROL MODULE	TLN4635A STATION CONTROL MODULE	TLN4638A F1-"PL" TONE CONTROL MODULE	TLN4658A F1 TONE CONTROL MODULE	TLN4659A F1-"PL" DC TRANSFER MODULE	TLN4660A F2-R2 MUTE DC TRANSFER MODULE	TLN4661A F1 DC TRANSFER MODULE	TLN4663A C2-R2 DC TRANSFER MODULE	TLN4665A F2 TONE CONTROL MODULE	TLN4669A LINE DRIVER MODULE 2-WIRE 1-RECEIVER	TLN4670A LINE DRIVER MODULE 2-WIRE 2-RECEIVER
C5					X			X					X			X	
C5					X	X		X		X						X	
C5					X			X				X				X	
C5					X	X		X		X					X	X	
C5					X			X						X		X	
C5					X	X	X	X		X						X	
C5					X			X				X					X
C5					X	X		X		X					X		X
C5	X	X	X	X	X			X			X					X	
C5	X	X	X	X	X	X		X	X							X	
C5	X	X	X	X	X			X				X				X	
C5	X	X	X	X	X	X		X	X						X	X	
C5	X	X	X	X	X			X						X		X	
C5	X	X	X	X	X	X		X	X							X	
C5	2	2	2	2	X			X				X					X
C5	2	2	2	2	X	X		X	X						X		X
C63					X			X					X			X	
C63					X	X		X		X						X	
C63					X			X				X				X	
C63					X	X		X		X					X	X	
C63					X			X						X		X	
C63					X	X	X	X		X						X	
C63					X			X				X					X
C63					X	X		X		X					X		X
C63	X	X	X	X	X			X			X					X	
C63	X	X	X	X	X	X		X	X							X	
C63	X	X	X	X	X			X				X				X	
C63	X	X	X	X	X	X		X	X						X	X	
C63	X	X	X	X	X			X						X		X	
C63	X	X	X	X	X	X		X	X							X	
C63	2	2	2	2	X			X				X					X
C63	2	2	2	2	X	X		X	X						X		X

RCB"AT" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
REPEATER (RT) STATIONS
CONTINUOUS & INTERMITTENT DUTY
"AT" SUFFIX MODELS
132-174 MHz

CODE:

☒ = ONE ITEM SUPPLIED

0 = DUPLEXER UNIT SUPPLIED ONLY WHEN USED ABOVE 148 MHz AND TRANSMIT-RECEIVE FREQUENCIES ARE SEPARATED BY 1.5 MHz OR GREATER.

* INDICATES A MODEL SERIES. SPECIFIC MODEL DEPENDS ON CARRIER FREQUENCY. (NOTE: 60-WATT STATIONS AVAILABLE ONLY FOR 150.8-174 MHz.)

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER & NUMBER COMBINATIONS.

C53RCB-1105 AT
- 5= DC REMOTE CONTROL
  6= TONE REMOTE CONTROL
- 1= CARRIER SQUELCH
  3= "PRIVATE-LINE" SQUELCH
- C= CONTINUOUS DUTY
  T= INTERMITTENT DUTY
- 5= 60 W RF OUTPUT
  6= 90 W RF OUTPUT
  7= 100 W RF OUTPUT WITH CONTINUOUS DUTY STATIONS
  110 W RF OUTPUT WITH INTERMITTENT DUTY

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	CONTROL TYPE	FCC LICENSE DESIGNATION	TRANSMITTER	*TLD1700A POWER AMPLIFIER, 60-WATT CONTINUOUS DUTY	*TLD1690A POWER AMPLIFIER, 100-WATT CONTINUOUS DUTY	*TLD1710A EXCITER-DRIVER (CONTINUOUS DUTY STATIONS)	TLN1434A SHIELD AND FILTER, TRANSMITTER	KNX1019A CHANNEL ELEMENT, TRANSMITTER	*TTD1690AA TRANSMITTER, 90/110-WATT INTERMITTENT DUTY	RECEIVER	*TRD1800AB RECEIVER	K1005A CHANNEL ELEMENT, RECEIVER	TLN1435A SHIELD AND FILTER, RECEIVER	MISCELLANEOUS	T1487AF DUPLEXER	TPN1095A POWER SUPPLY, 60-WATT CONTINUOUS DUTY AND 90/110-WATT INTERMITTENT DUTY	TPN1096A POWER SUPPLY, 90/100-WATT CONTINUOUS DUTY	TKN6617A STATION INTERCABLING (CONTINUOUS DUTY STATIONS)	TKN6616A STATION INTERCABLING (INTERMITTENT DUTY STATIONS)	TLN4861A HARDWARE, CABINET (CONTINUOUS DUTY STATIONS)	TLN4859A HARDWARE, CABINET (INTERMITTENT DUTY STATIONS)	THN6142A CABINET (CONTINUOUS DUTY STATIONS)	THN6141A CABINET (INTERMITTENT DUTY STATIONS)	"PRIVATE-LINE"	TLN4293B "PL" ENCODER	TLN4294B "PL" DECODER	TLN6824A "VIBRASENDER" RESONANT REED	TLN8381A "VIBRASPONDER" RESONANT REED	REMOTE CONTROL	TCN1107A REMOTE CONTROL CHASSIS	TLN8799A SERVICE BOARD	TLN4669A LINE DRIVER MODULE 2-WIRE 1-RECEIVER	TLN4662A SQUELCH GATE MODULE	TLN4635A STATION CONTROL MODULE	TLN4661A F1 DC TRANSFER MODULE	TLN4659A F1-"PL" DC TRANSFER MODULE	TLN4658A F1 TONE CONTROL MODULE	TLN4638A F1-"PL" TONE CONTROL MODULE	TLN1245B GUARD TONE DECODER MODULE	TLN4636A TIME-OUT TIMER MODULE
CONTINUOUS DUTY STATIONS																																										
C53RCB-1105AT	60	CARRIER	DC	CC3185		X		X	X	X			X	X	X		0	X		X		X		X								X	X	X	X	X	X					X
C53RCB-1106AT	60	CARRIER	TONE	CC3185		X		X	X	X			X	X	X		0	X		X		X		X								X	X	X	X	X			X		X	X
C53RCB-3105AT	60	TONE-CODED	DC	CC3185		X		X	X	X			X	X	X		0	X		X		X		X			X	X	X	X		X	X	X	X	X		X				X
C53RCB-3106AT	60	TONE-CODED	TONE	CC3185		X		X	X	X			X	X	X		0	X		X		X		X			X	X	X	X		X	X	X	X	X				X	X	X
C63RCB-1105AT	90	CARRIER	DC	CC3193			X	X	X	X			X	X	X		0		X	X		X		X								X	X	X	X	X	X					X
C63RCB-1106AT	90	CARRIER	TONE	CC3193			X	X	X	X			X	X	X		0		X	X		X		X								X	X	X	X	X			X		X	X
C63RCB-3105AT	90	TONE-CODED	DC	CC3193			X	X	X	X			X	X	X		0		X	X		X		X			X	X	X	X		X	X	X	X	X		X				X
C63RCB-3106AT	90	TONE-CODED	TONE	CC3193			X	X	X	X			X	X	X		0		X	X		X		X			X	X	X	X		X	X	X	X	X				X	X	X
C73RCB-1105AT	100	CARRIER	DC	CC3184			X	X	X	X			X	X	X		0		X	X		X		X								X	X	X	X	X	X					X
C73RCB-1106AT	100	CARRIER	TONE	CC3184			X	X	X	X			X	X	X		0		X	X		X		X								X	X	X	X	X			X		X	X
C73RCB-3105AT	100	TONE-CODED	DC	CC3184			X	X	X	X			X	X	X		0		X	X		X		X			X	X	X	X		X	X	X	X	X		X				X
C73RCB-3106AT	100	TONE-CODED	TONE	CC3184			X	X	X	X			X	X	X		0		X	X		X		X			X	X	X	X		X	X	X	X	X				X	X	X
INTERMITTENT DUTY STATIONS																																										
C63RTB-1105AT	90	CARRIER	DC	CC3182					X	X	X		X	X	X		0	X			X		X		X							X	X	X	X	X	X					X
C63RTB-1106AT	90	CARRIER	TONE	CC3182					X	X	X		X	X	X		0	X			X		X		X							X	X	X	X	X			X		X	X
C63RTB-3105AT	90	TONE-CODED	DC	CC3182					X	X	X		X	X	X		0	X			X		X		X		X	X	X	X		X	X	X	X	X		X				X
C63RTB-3106AT	90	TONE-CODED	TONE	CC3182					X	X	X		X	X	X		0	X			X		X		X		X	X	X	X		X	X	X	X	X				X	X	X
C73RTB-1105AT	110	CARRIER	DC	CC3183					X	X	X		X	X	X		0	X			X		X		X							X	X	X	X	X	X					X
C73RTB-1106AT	110	CARRIER	TONE	CC3183					X	X	X		X	X	X		0	X			X		X		X							X	X	X	X	X			X		X	X
C73RTB-3105AT	110	TONE-CODED	DC	CC3183					X	X	X		X	X	X		0	X			X		X		X		X	X	X	X		X	X	X	X	X		X				X
C73RTB-3106AT	110	TONE-CODED	TONE	CC3183					X	X	X		X	X	X		0	X			X		X		X		X	X	X	X		X	X	X	X	X				X	X	X

"A" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
BASE STATIONS-CONTINUOUS DUTY
"A" SUFFIX MODELS
132-174 MHz

CODE:

☒ = ONE ITEM SUPPLIED

[2] = TWO ITEMS SUPPLIED

[0] = TWO K1005A RCVR ELEMENTS SUPPLIED UNLESS RECEIVER CARRIER FREQS. ARE SEPARATED BY 11.7 MHz ± 30 KHz (OR A SUBMULTIPLE THEREOF). IN THIS CASE, A K1005A CHANNEL ELEMENT IS USED IN THE FIRST RECEIVER AND A KXN1022A CHANNEL ELEMENT IS USED IN THE SECOND RECEIVER.

* INDICATES A MODEL SERIES. SPECIFIC MODEL DEPENDS ON CARRIER FREQUENCY.

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER AND NUMBER COMBINATIONS.

C53RCB-1105A
5 = DC REMOTE CONTROL
6 = TONE REMOTE CONTROL
0 = T1-R1
1 = T2-R1
2 = T2-R2
4 = T2-2R (2 RECEIVER)
1 = CARRIER SQUELCH
3 = "PRIVATE-LINE" TONE-CODED SQUELCH
5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 = 100 W RF OUTPUT

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	T1 = ONE XMIT FREQ. T2 = TWO XMIT FREQS. R1 = ONE RCVR FREQ. R2 = TWO RCVR FREQS. 2R = TWO RCVRS - ONE FREQ. EACH	CONTROL TYPE	FCC LICENSE DESIGNATION	TRANSMITTER				RECEIVER					MISCELLANEOUS								"PRIVATE-LINE"				REMOTE CONTROL												
DESCRIPTION ITEM						POWER AMPLIFIER, 60-WATT *TLD1700A	POWER AMPLIFIER, 100-WATT *TLD1690A	EXCITER-DRIVER *TLD1710A	TRANSMITTER CHANNEL ELEMENT KXN1019A	RECEIVER *TRD1800AB	RECEIVER CHANNEL ELEMENT K1005A	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF) KXN1022A	SHIFTED IF KIT TLD8740A	2-RECEIVER COUPLER TLN4758A	SERVICE BOARD TLN8799A	ANTENNA SWITCH TLN4295A	HARDWARE, CABINET TLN4863A	CABINET THN6142A	POWER SUPPLY, 60-WATT TPN1095A	POWER SUPPLY, 100-WATT TPN1096A	STATION INTERCABLING (1-RECEIVER STATIONS) TKN6563A	STATION INTERCABLING (2-RECEIVER STATIONS) TKN6571A	"PL" ENCODER TLN4293B	"VIBRASENDER" RESONANT REED TLN6824A	"PL" DECODER TLN4294B	"VIBRASPONDER" RESONANT REED TLN8381A	REMOTE CONTROL CHASSIS TCN1107A	GUARD TONE DECODER MODULE TLN1245B	C2-R2 TONE CONTROL MODULE TLN1248A	STATION CONTROL MODULE TLN4635A	F1-"PL" TONE CONTROL MODULE TLN4638A	F1 TONE CONTROL MODULE TLN4658A	F1-"PL" DC TRANSFER MODULE TLN4659A	F2-R2 MUTE DC TRANSFER MODULE TLN4660A	F1 DC TRANSFER MODULE TLN4661A	C2-R2 DC TRANSFER MODULE TLN4663A	F2 TONE CONTROL MODULE TLN4665A	LINE DRIVER MODULE 2-WIRE 1-RECEIVER TLN4669A	LINE DRIVER MODULE 2-WIRE 2-RECEIVER TLN4670A
C53RCB-1105A	60	C.S.	T1-R1	DC	CC3185	☒		☒	☒	☒	☒				☒	☒	☒	☒	☒		☒						☒			☒					☒			☒	
C53RCB-1106A	60	C.S.	T1-R1	TONE	CC3185	☒		☒	☒	☒	☒				☒	☒	☒	☒	☒		☒						☒	☒		☒		☒						☒	
C53RCB-1115A	60	C.S.	T2-R1	DC	CC3185	☒		☒	2	☒	☒				☒	☒	☒	☒	☒		☒						☒			☒				☒				☒	
C53RCB-1116A	60	C.S.	T2-R1	TONE	CC3185	☒		☒	2	☒	☒				☒	☒	☒	☒	☒		☒						☒	☒		☒		☒					☒	☒	
C53RCB-1125A	60	C.S.	T2-R2	DC	CC3185	☒		☒	2	☒	2				☒	☒	☒	☒	☒		☒						☒			☒						☒		☒	
C53RCB-1126A	60	C.S.	T2-R2	TONE	CC3185	☒		☒	2	☒	2				☒	☒	☒	☒	☒		☒						☒	☒	☒	☒		☒						☒	
C53RCB-1145A	60	C.S.	T2-2R	DC	CC3185	☒		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒			☒					☒			☒				☒					☒
C53RCB-1146A	60	C.S.	T2-2R	TONE	CC3185	☒		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒			☒					☒	☒		☒		☒					☒		☒
C53RCB-3105A	60	"PL"	T1-R1	DC	CC3185	☒		☒	☒	☒	☒				☒	☒	☒	☒	☒		☒		☒	☒	☒	☒	☒			☒			☒					☒	
C53RCB-3106A	60	"PL"	T1-R1	TONE	CC3185	☒		☒	☒	☒	☒				☒	☒	☒	☒	☒		☒		☒	☒	☒	☒	☒	☒		☒	☒							☒	
C53RCB-3115A	60	"PL"	T2-R1	DC	CC3185	☒		☒	2	☒	☒				☒	☒	☒	☒	☒		☒		☒	☒	☒	☒	☒			☒				☒				☒	
C53RCB-3116A	60	"PL"	T2-R1	TONE	CC3185	☒		☒	2	☒	☒				☒	☒	☒	☒	☒		☒		☒	☒	☒	☒	☒	☒		☒	☒						☒	☒	
C53RCB-3125A	60	"PL"	T2-R2	DC	CC3185	☒		☒	2	☒	2				☒	☒	☒	☒	☒		☒		☒	☒	☒	☒	☒			☒						☒		☒	
C53RCB-3126A	60	"PL"	T2-R2	TONE	CC3185	☒		☒	2	☒	2				☒	☒	☒	☒	☒		☒		☒	☒	☒	☒	☒	☒		☒	☒							☒	
C53RCB-3145A	60	"PL"	T2-2R	DC	CC3185	☒		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒			☒	2	2	2	2	☒			☒				☒					☒
C53RCB-3146A	60	"PL"	T2-2R	TONE	CC3185	☒		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒			☒	2	2	2	2	☒	☒		☒	☒						☒		☒
C63/C73RCB-1105A	△	C.S.	T1-R1	DC	△ △		☒	☒	☒	☒	☒				☒	☒	☒	☒		☒	☒						☒			☒					☒			☒	
C63/C73RCB-1106A	△	C.S.	T1-R1	TONE	△ △		☒	☒	☒	☒	☒				☒	☒	☒	☒		☒	☒						☒	☒		☒		☒						☒	
C63/C73RCB-1115A	△	C.S.	T2-R1	DC	△ △		☒	☒	2	☒	☒				☒	☒	☒	☒		☒	☒						☒			☒				☒				☒	
C63/C73RCB-1116A	△	C.S.	T2-R1	TONE	△ △		☒	☒	2	☒	☒				☒	☒	☒	☒		☒	☒						☒	☒		☒		☒					☒	☒	
C63/C73RCB-1125A	△	C.S.	T2-R2	DC	△ △		☒	☒	2	☒	2				☒	☒	☒	☒		☒	☒						☒			☒						☒		☒	
C63/C73RCB-1126A	△	C.S.	T2-R2	TONE	△ △		☒	☒	2	☒	2				☒	☒	☒	☒		☒	☒						☒	☒	☒	☒		☒						☒	
C63/C73RCB-1145A	△	C.S.	T2-2R	DC	△ △		☒	☒	2	2	0	0	0	☒	☒	☒	☒	☒		☒		☒					☒			☒				☒					☒
C63/C73RCB-1146A	△	C.S.	T2-2R	TONE	△ △		☒	☒	2	2	0	0	0	☒	☒	☒	☒	☒		☒		☒					☒	☒		☒		☒					☒		☒
C63/C73RCB-3105A	△	"PL"	T1-R1	DC	△ △		☒	☒	☒	☒	☒				☒	☒	☒	☒		☒	☒		☒	☒	☒	☒	☒			☒			☒					☒	
C63/C73RCB-3106A	△	"PL"	T1-R1	TONE	△ △		☒	☒	☒	☒	☒				☒	☒	☒	☒		☒	☒		☒	☒	☒	☒	☒	☒		☒	☒							☒	
C63/C73RCB-3115A	△	"PL"	T2-R1	DC	△ △		☒	☒	2	☒	☒				☒	☒	☒	☒		☒	☒		☒	☒	☒	☒	☒			☒				☒				☒	
C63/C73RCB-3116A	△	"PL"	T2-R1	TONE	△ △		☒	☒	2	☒	☒				☒	☒	☒	☒		☒	☒		☒	☒	☒	☒	☒	☒		☒	☒						☒	☒	
C63/C73RCB-3125A	△	"PL"	T2-R2	DC	△ △		☒	☒	2	☒	2				☒	☒	☒	☒		☒	☒		☒	☒	☒	☒	☒			☒						☒		☒	
C63/C73RCB-3126A	△	"PL"	T2-R2	TONE	△ △		☒	☒	2	☒	2				☒	☒	☒	☒		☒	☒		☒	☒	☒	☒	☒	☒		☒	☒							☒	
C63/C73RCB-3145A	△	"PL"	T2-2R	DC	△ △		☒	☒	2	2	0	0	0	☒	☒	☒	☒	☒		☒		☒	2	2	2	2	☒			☒				☒					☒
C63/C73RCB-3146A	△	"PL"	T2-2R	TONE	△ △		☒	☒	2	2	0	0	0	☒	☒	☒	☒	☒		☒		☒	2	2	2	2	☒	☒		☒	☒						☒		☒

△ C63 SERIES = 90 W
C73 SERIES = 100 W

△ △ C63 SERIES = CC3193
C73 SERIES = CC3184

EPS-9134-D

																																																MODEL	DESCRIPTION
																																																	TRANSMITTER
																																X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	*TTD1700A	TRANSMITTER 60 W
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																	*TTD1690AA	TRANSMITTER 90-110 W
2	2	2	2	2	2	X	X	2	2	2	2	2	2	X	X	2	2	2	2	2	2	X	X	2	2	2	2	2	2	X	X	2	2	2	2	2	2	X	X	2	2	2	2	2	2	X	X	KXN1019A	TRANSMITTER CHANNEL ELEMENT
																																																	RECEIVER
2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	2	2	X	X	X	X	X	X	*TRD1800AB	RECEIVER
0	0	2	2	X	X	X	X	0	0	2	2	X	X	X	X	0	0	2	2	X	X	X	X	0	0	2	2	X	X	X	X	0	0	2	2	X	X	X	X	0	0	2	2	X	X	X	X	K1005A	RECEIVER CHANNEL ELEMENT
0	0							0	0							0	0							0	0							0	0							0	0							KXN1022A	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF)
0	0							0	0							0	0							0	0							0	0							0	0							TLD8740A	SHIFTED IF KIT
X	X							X	X							X	X							X	X							X	X							X	X							TLN4758A	2-RECEIVER COUPLER
																																																	MISCELLANEOUS
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TLN8799A	SERVICE BOARD
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TLN4295A	ANTENNA SWITCH
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TLN4735A	HARDWARE, CABINET
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	THN6141A	CABINET
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TPN1095A	POWER SUPPLY
		X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X	TKN6561A	STATION INTERCABLING (1-RECEIVER STATIONS)
X	X							X	X							X	X							X	X							X	X							X	X							TKN6562A	STATION INTERCABLING (2-RECEIVER STATIONS)
																																																	"PRIVATE-LINE"
X	X	X	X	X	X	X	X									X	X	X	X	X	X	X	X									X	X	X	X	X	X	X	X									TLN4293B	"PL" ENCODER
X	X	X	X	X	X	X	X									X	X	X	X	X	X	X	X									X	X	X	X	X	X	X	X									TLN6824A	"VIBRASENDER" RESONANT REED
2	2	X	X	X	X	X	X									2	2	X	X	X	X	X	X									2	2	X	X	X	X	X	X									TLN4294B	"PL" DECODER
2	2	X	X	X	X	X	X									2	2	X	X	X	X	X	X									2	2	X	X	X	X	X	X									TLN8381A	"VIBRASPONDER" RESONANT REED
																																																	REMOTE CONTROL
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TCN1107A	REMOTE CONTROL CHASSIS
X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		TLN1245B	GUARD TONE DECODER MODULE
		X								X								X								X								X								X						TLN1248A	C2-R2 TONE CONTROL MODULE
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TLN4635A	STATION CONTROL MODULE
X		X		X		X										X		X		X		X										X		X		X		X										TLN4638A	F1-"PL" TONE CONTROL MODULE
								X		X		X		X										X		X		X		X										X		X		X		X		TLN4658A	F1 TONE CONTROL MODULE
							X																X																X									TLN4659A	F1-"PL" DC TRANSFER MODULE
	X				X				X				X				X				X				X				X				X				X				X				X			TLN4660A	F2-R2 MUTE DC TRANSFER MODULE
															X																X																X	TLN4661A	F1-CS DC TRANSFER MODULE
			X								X								X								X								X								X					TLN4663A	C2-R2 DC TRANSFER MODULE
X				X				X				X				X				X				X				X				X				X				X				X				TLN4665A	F2 TONE CONTROL MODULE
		X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X	TLN4669A	LINE DRIVER MODULE/2-WIRE 1-RECEIVER
X	X							X	X							X	X							X	X							X	X							X	X							TLN4670A	LINE DRIVER MODULE/2-WIRE 2-RECEIVER

C73R	C73R	C73R	C73R	C73R	C73R	C73R	C73R	C63R	C63R	C63R	C63R	C63R	C63R	C63R	C63R	C53R	C53R	C53R	C53R	C53R	C53R	C53R	C53R	STATI	
																								TLN5725A	DIGITAL PRIVATE-LINE ENCODER
																									REMOTE CONTROL
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TCN1107A	REMOTE CONTROL CHASSIS
X		X		X		X		X		X		X		X		X		X		X		X		TLN1245B	GUARD TONE DECODER MODULE
		X								X								X						TLN1248A	C2-R2 TONE CONTROL MODULE
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	TLN4635B	STATION CONTROL MODULE
X		X		X		X		X		X		X		X		X		X		X		X		TLN4638A	F1-"PL" TONE CONTROL MODULE
																								TLN4658A	F1 TONE CONTROL MODULE
							X								X								X	TLN4659A	F1-"PL" DC TRANSFER MODULE
	X				X				X				X				X				X			TLN4660A	F2-R2 MUTE DC TRANSFER MODULE
																								TLN4661A	F1-CS DC TRANSFER MODULE
			X								X								X					TLN4663A	C2-R2 DC TRANSFER MODULE
X				X				X				X				X				X				TLN4665A	F2 TONE CONTROL MODULE
		X	X	X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X	TLN4669A	LINE DRIVER MODULE/2-WIRE 1-RECEIVER
X	X							X	X							X	X							TLN4670A	LINE DRIVER MODULE/2-WIRE 2-RECEIVER

EPS-18075-C

"A" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR" "COMPA-STATION"
BASE STATIONS-INTERMITTENT DUTY
"A" SUFFIX MODELS
132-174 MHz

CODE:

☒ = ONE ITEM SUPPLIED

2 = TWO ITEMS SUPPLIED

0 = TWO K1005A RCVR ELEMENTS SUPPLIED UNLESS RECEIVER CARRIER FREQS. ARE SEPARATED BY 11.7 MHz ±30 kHz (OR A SUB-MULTIPLE THEREOF). IN THIS CASE A K1005A CHANNEL ELEMENT IS USED IN FIRST RECEIVER AND A KXN1022A CHANNEL ELEMENT IS USED IN SECOND RECEIVER. THE IF OF THE SECOND RECEIVER IS SHIFTED.

* INDICATES A SERIES OF MODELS. SPECIFIC MODEL DEPENDS UPON CARRIER FREQUENCY.

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER AND NUMBER COMBINATIONS.

C53RTB-1105A
5 = DC REMOTE CONTROL
6 = TONE REMOTE CONTROL
0 = T1-R1
1 = T2-R1
2 = T2-R2
4 = T2-2R (2 RECEIVERS)
1 = CARRIER SQUELCH
3 = "PRIVATE-LINE" TONE-CODED SQUELCH
5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 = 110 W RF OUTPUT

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	T1 = ONE XMIT FREQ. T2 = TWO XMIT FREQS. R1 = ONE RCVR FREQ. R2 = TWO RCVR FREQS. 2R = TWO RCVRS - ONE FREQ. EACH	CONTROL TYPE	FCC LICENSE DESIGNATION
C53RTB-1105A	60	CARRIER	T1-R1	DC	CC3181
C53RTB-1106A	60	CARRIER	T1-R1	TONE	CC3181
C53RTB-1115A	60	CARRIER	T2-R1	DC	CC3181
C53RTB-1116A	60	CARRIER	T2-R1	TONE	CC3181
C53RTB-1125A	60	CARRIER	T2-R2	DC	CC3181
C53RTB-1126A	60	CARRIER	T2-R2	TONE	CC3181
C53RTB-1145A	60	CARRIER	T2-2R	DC	CC3181
C53RTB-1146A	60	CARRIER	T2-2R	TONE	CC3181
C53RTB-3105A	60	"PL"	T1-R1	DC	CC3181
C53RTB-3106A	60	"PL"	T1-R1	TONE	CC3181
C53RTB-3115A	60	"PL"	T2-R1	DC	CC3181
C53RTB-3116A	60	"PL"	T2-R1	TONE	CC3181
C53RTB-3125A	60	"PL"	T2-R2	DC	CC3181
C53RTB-3126A	60	"PL"	T2-R2	TONE	CC3181
C53RTB-3145A	60	"PL"	T2-2R	DC	CC3181
C53RTB-3146A	60	"PL"	T2-2R	TONE	CC3181
C63RTB-1105A	90	CARRIER	T1-R1	DC	CC3182
C63RTB-1106A	90	CARRIER	T1-R1	TONE	CC3182
C63RTB-1115A	90	CARRIER	T2-R1	DC	CC3182
C63RTB-1116A	90	CARRIER	T2-R1	TONE	CC3182
C63RTB-1125A	90	CARRIER	T2-R2	DC	CC3182
C63RTB-1126A	90	CARRIER	T2-R2	TONE	CC3182
C63RTB-1145A	90	CARRIER	T2-2R	DC	CC3182
C63RTB-1146A	90	CARRIER	T2-2R	TONE	CC3182
C63RTB-3105A	90	"PL"	T1-R1	DC	CC3182
C63RTB-3106A	90	"PL"	T1-R1	TONE	CC3182
C63RTB-3115A	90	"PL"	T2-R1	DC	CC3182
C63RTB-3116A	90	"PL"	T2-R1	TONE	CC3182
C63RTB-3125A	90	"PL"	T2-R2	DC	CC3182
C63RTB-3126A	90	"PL"	T2-R2	TONE	CC3182
C63RTB-3145A	90	"PL"	T2-2R	DC	CC3182
C63RTB-3146A	90	"PL"	T2-2R	TONE	CC3182
C73RTB-1105A	110	CARRIER	T1-R1	DC	CC3183
C73RTB-1106A	110	CARRIER	T1-R1	TONE	CC3183
C73RTB-1115A	110	CARRIER	T2-R1	DC	CC3183
C73RTB-1116A	110	CARRIER	T2-R1	TONE	CC3183
C73RTB-1125A	110	CARRIER	T2-R2	DC	CC3183
C73RTB-1126A	110	CARRIER	T2-R2	TONE	CC3183
C73RTB-1145A	110	CARRIER	T2-2R	DC	CC3183
C73RTB-1146A	110	CARRIER	T2-2R	TONE	CC3183
C73RTB-3105A	110	"PL"	T1-R1	DC	CC3183
C73RTB-3106A	110	"PL"	T1-R1	TONE	CC3183
C73RTB-3115A	110	"PL"	T2-R1	DC	CC3183
C73RTB-3116A	110	"PL"	T2-R1	TONE	CC3183
C73RTB-3125A	110	"PL"	T2-R2	DC	CC3183
C73RTB-3126A	110	"PL"	T2-R2	TONE	CC3183
C73RTB-3145A	110	"PL"	T2-2R	DC	CC3183
C73RTB-3146A	110	"PL"	T2-2R	TONE	CC3183

DESCRIPTION	TRANSMITTER			RECEIVER					MISCELLANEOUS							"PRIVATE-LINE"				REMOTE CONTROL												
	TRANSMITTER 60 W	TRANSMITTER 90-110 W	TRANSMITTER CHANNEL ELEMENT	RECEIVER	RECEIVER CHANNEL ELEMENT	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF)	SHIFTED IF KIT	2-RECEIVER COUPLER	SERVICE BOARD	ANTENNA SWITCH	HARDWARE, CABINET	CABINET	POWER SUPPLY	STATION INTERCABLING (1-RECEIVER STATIONS)	STATION INTERCABLING (2-RECEIVER STATIONS)	"PL" ENCODER	"VIBRASENDER" RESONANT REED	"PL" DECODER	"VIBRASPONDER" RESONANT REED	REMOTE CONTROL CHASSIS	GUARD TONE DECODER MODULE	C2-R2 TONE CONTROL MODULE	STATION CONTROL MODULE	F1-"PL" TONE CONTROL MODULE	F1 TONE CONTROL MODULE	F1-"PL" DC TRANSFER MODULE	F2-R2 MUTE DC TRANSFER MODULE	F1-CS DC TRANSFER MODULE	C2-R2 DC TRANSFER MODULE	F2 TONE CONTROL MODULE	LINE DRIVER MODULE/2-WIRE 1-RECEIVER	LINE DRIVER MODULE/2-WIRE 2-RECEIVER
MODEL	*TTD1700A	*TTD1690AA	KXN1019A	*TRD1800AB	K1005A	KXN1022A	TLD8740A	TLN4758A	TLN8799A	TLN4295A	TLN4735A	THN6141A	TPN1095A	TKN6561A	TKN6562A	TLN4293B	TLN6824A	TLN4294B	TLN8381A	TCN1107A	TLN1245B	TLN1248A	TLN4635A	TLN4638A	TLN4658A	TLN4659A	TLN4660A	TLN4661A	TLN4663A	TLN4665A	TLN4669A	TLN4670A
C53RTB-1105A	☒		☒	☒	☒				☒	☒	☒	☒	☒	☒						☒			☒					☒			☒	
C53RTB-1106A	☒		☒	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒						☒	
C53RTB-1115A	☒		2	☒	☒				☒	☒	☒	☒	☒	☒						☒			☒				☒				☒	
C53RTB-1116A	☒		2	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒					☒	☒	
C53RTB-1125A	☒		2	☒	2				☒	☒	☒	☒	☒	☒						☒			☒						☒		☒	
C53RTB-1126A	☒		2	☒	2				☒	☒	☒	☒	☒	☒						☒	☒	☒	☒		☒						☒	
C53RTB-1145A	☒		2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒					☒			☒				☒					☒
C53RTB-1146A	☒		2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒					☒	☒		☒		☒					☒		☒
C53RTB-3105A	☒		☒	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒			☒					☒	
C53RTB-3106A	☒		☒	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒							☒	
C53RTB-3115A	☒		2	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒				☒				☒	
C53RTB-3116A	☒		2	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒						☒	☒	
C53RTB-3125A	☒		2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒						☒		☒	
C53RTB-3126A	☒		2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒	☒	☒	☒							☒	
C53RTB-3145A	☒		2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒	☒	☒	2	2	☒			☒				☒					☒
C53RTB-3146A	☒		2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒	☒	☒	2	2	☒	☒		☒	☒						☒		☒
C63RTB-1105A		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒						☒			☒					☒			☒	
C63RTB-1106A		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒						☒	
C63RTB-1115A		☒	2	☒	☒				☒	☒	☒	☒	☒	☒						☒			☒				☒				☒	
C63RTB-1116A		☒	2	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒					☒	☒	
C63RTB-1125A		☒	2	☒	2				☒	☒	☒	☒	☒	☒						☒			☒						☒		☒	
C63RTB-1126A		☒	2	☒	2				☒	☒	☒	☒	☒	☒						☒	☒	☒	☒		☒						☒	
C63RTB-1145A		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒					☒			☒				☒					☒
C63RTB-1146A		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒					☒	☒		☒		☒					☒		☒
C63RTB-3105A		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒			☒					☒	
C63RTB-3106A		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒							☒	
C63RTB-3115A		☒	2	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒				☒				☒	
C63RTB-3116A		☒	2	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒						☒	☒	
C63RTB-3125A		☒	2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒						☒		☒	
C63RTB-3126A		☒	2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒	☒	☒	☒							☒	
C63RTB-3145A		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒	☒	☒	2	2	☒			☒				☒					☒
C63RTB-3146A		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒	☒	☒	2	2	☒	☒		☒	☒						☒		☒
C73RTB-1105A		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒						☒			☒					☒			☒	
C73RTB-1106A		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒						☒	
C73RTB-1115A		☒	2	☒	☒				☒	☒	☒	☒	☒	☒						☒			☒				☒				☒	
C73RTB-1116A		☒	2	☒	☒				☒	☒	☒	☒	☒	☒						☒	☒		☒		☒					☒	☒	
C73RTB-1125A		☒	2	☒	2				☒	☒	☒	☒	☒	☒						☒			☒						☒		☒	
C73RTB-1126A		☒	2	☒	2				☒	☒	☒	☒	☒	☒						☒	☒	☒	☒		☒						☒	
C73RTB-1145A		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒					☒			☒				☒					☒
C73RTB-1146A		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒					☒	☒		☒		☒					☒		☒
C73RTB-3105A		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒			☒					☒	
C73RTB-3106A		☒	☒	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒							☒	
C73RTB-3115A		☒	2	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒				☒				☒	
C73RTB-3116A		☒	2	☒	☒				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒		☒	☒						☒	☒	
C73RTB-3125A		☒	2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒			☒						☒		☒	
C73RTB-3126A		☒	2	☒	2				☒	☒	☒	☒	☒	☒		☒	☒	☒	☒	☒	☒	☒	☒	☒							☒	
C73RTB-3145A		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒	☒	☒	2	2	☒			☒				☒					☒
C73RTB-3146A		☒	2	2	0	0	0	☒	☒	☒	☒	☒	☒		☒	☒	☒	2	2	☒	☒		☒	☒						☒		☒

EPS-8862-C

RTB "A" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR"® "COMPA-STATION"®
BASE STATIONS - INTERMITTENT DUTY
"DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH
132-174 MHz

CODE:

X = ONE ITEM SUPPLIED

2 = TWO ITEMS SUPPLIED

0 = TWO K1005A RCVR ELEMENTS SUPPLIED UNLESS RECEIVER CARRIER FREQS. ARE SEPARATED BY 11.7 MHz ±30 kHz (OR A SUB-MULTIPLE THEREOF). IN THIS CASE A K1005A CHANNEL ELEMENT IS USED IN FIRST RECEIVER AND A KXN1022A CHANNEL ELEMENT IS USED IN SECOND RECEIVER. THE IF OF THE SECOND RECEIVER IS SHIFTED.

* = INDICATES A SERIES OF MODELS. SPECIFIC MODEL DEPENDS UPON CARRIER FREQUENCY.

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER AND NUMBER COMBINATIONS.

C53RTB-6105A
5 = DC REMOTE CONTROL
6 = TONE REMOTE CONTROL
0 = T1-R1
1 = T2-R1
2 = T2-R2
4 = T2-2R (2 RECEIVERS)
6 = "DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH
5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 = 110 W RF OUTPUT

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	T1 = ONE XMIT FREQ. T2 = TWO XMIT FREQS. R1 = ONE RCVR FREQ. R2 = TWO RCVR FREQS. 2R = TWO RCVRS - ONE FREQ. EACH	CONTROL TYPE	FCC LICENSE DESIGNATION	DESCRIPTION	TRANSMITTER			RECEIVER					MISCELLANEOUS							"DIGITAL PRIVATE-LINE"				REMOTE CONTROL												
							TRANSMITTER 60 W	TRANSMITTER 90-110 W	TRANSMITTER CHANNEL ELEMENT	RECEIVER	RECEIVER CHANNEL ELEMENT	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF)	SHIFTED IF KIT	2-RECEIVER COUPLER	SERVICE BOARD	ANTENNA SWITCH	HARDWARE, CABINET	CABINET	POWER SUPPLY (FORMERLY TPN1110A)	STATION INTERCABLING (1-RECEIVER STATIONS)	STATION INTERCABLING (2-RECEIVER STATIONS)	"DIGITAL PRIVATE-LINE" ENCODER	CODE PLUG	"DIGITAL PRIVATE-LINE" DECODER	"DIGITAL PRIVATE-LINE" ENCODER	REMOTE CONTROL CHASSIS	GUARD TONE DECODER MODULE	C2-R2 TONE CONTROL MODULE	STATION CONTROL MODULE	F1-"PL" TONE CONTROL MODULE	F1 TONE CONTROL MODULE	F1-"PL" DC TRANSFER MODULE	F2-R2 MUTE DC TRANSFER MODULE	F1-CS DC TRANSFER MODULE	C2-R2 DC TRANSFER MODULE	F2 TONE CONTROL MODULE	LINE DRIVER MODULE/2-WIRE 1-RECEIVER	LINE DRIVER MODULE/2-WIRE 2-RECEIVER
						MODEL	*TTD1700B	*TTD1690BA	KXN1019B	*TRD1800BB	K1005A	KXN1022A	TLD8740A	TLN4758A	TLN8799A	TLN4295A	TLN4735A	THN6141A	TPN1110B	TKN6561A	TKN6562A	TTN6003A	TRN6005A	TLN5729A	TLN5725A	TCN1107A	TLN1245B	TLN1248A	TLN4635B	TLN4638A	TLN4658A	TLN4659A	TLN4660A	TLN4661A	TLN4663A	TLN4665A	TLN4669A	TLN4670A
C53RTB-6105A	60	"DPL"	T1-R1	DC	CC3181		X		X	X	X				X	X	X	X	X	X		X	X	X		X			X			X					X	
C53RTB-6106A	60	"DPL"	T1-R1	TONE	CC3181		X		X	X	X				X	X	X	X	X	X		X	X	X		X	X		X	X							X	
C53RTB-6115A	60	"DPL"	T2-R1	DC	CC3181		X		2	X	X				X	X	X	X	X	X		X	X	X		X			X				X				X	
C53RTB-6116A	60	"DPL"	T2-R1	TONE	CC3181		X		2	X	X				X	X	X	X	X	X		X	X	X		X	X		X	X						X	X	
C53RTB-6125A	60	"DPL"	T2-R2	DC	CC3181		X		2	X	2				X	X	X	X	X	X		X	X	X		X			X						X		X	
C53RTB-6126A	60	"DPL"	T2-R2	TONE	CC3181		X		2	X	2				X	X	X	X	X	X		X	X	X		X	X	X	X	X							X	
C53RTB-6145A	60	"DPL"	T2-2R	DC	CC3181		X		2	2	0	0	0	X	X	X	X	X	X		X	X	2	2		X			X				X					X
C53RTB-6146A	60	"DPL"	T2-2R	TONE	CC3181		X		2	2	0	0	0	X	X	X	X	X	X		X	X	2	2		X	X		X	X						X		X
C63RTB-6105A	90	"DPL"	T1-R1	DC	CC3182			X	X	X	X				X	X	X	X	X	X		X	X	X		X			X			X					X	
C63RTB-6106A	90	"DPL"	T1-R1	TONE	CC3182			X	X	X	X				X	X	X	X	X	X		X	X	X		X	X		X	X							X	
C63RTB-6115A	90	"DPL"	T2-R1	DC	CC3182			X	2	X	X				X	X	X	X	X	X		X	X	X		X			X				X				X	
C63RTB-6116A	90	"DPL"	T2-R1	TONE	CC3182			X	2	X	X				X	X	X	X	X	X		X	X	X		X	X		X	X						X	X	
C63RTB-6125A	90	"DPL"	T2-R2	DC	CC3182			X	2	X	2				X	X	X	X	X	X		X	X	X		X			X						X		X	
C63RTB-6126A	90	"DPL"	T2-R2	TONE	CC3182			X	2	X	2				X	X	X	X	X	X		X	X	X		X	X	X	X	X							X	
C63RTB-6145A	90	"DPL"	T2-2R	DC	CC3182			X	2	2	0	0	0	X	X	X	X	X	X		X	X	2	2		X			X				X					X
C63RTB-6146A	90	"DPL"	T2-2R	TONE	CC3182			X	2	2	0	0	0	X	X	X	X	X	X		X	X	2	2		X	X		X	X						X		X
C73RTB-6105A	110	"DPL"	T1-R1	DC	CC3183			X	X	X	X				X	X	X	X	X	X		X	X	X		X			X			X					X	
C73RTB-6106A	110	"DPL"	T1-R1	TONE	CC3183			X	X	X	X				X	X	X	X	X	X		X	X	X		X	X		X	X							X	
C73RTB-6115A	110	"DPL"	T2-R1	DC	CC3183			X	2	X	X				X	X	X	X	X	X		X	X	X		X			X				X				X	
C73RTB-6116A	110	"DPL"	T2-R1	TONE	CC3183			X	2	X	X				X	X	X	X	X	X		X	X	X		X	X		X	X						X	X	
C73RTB-6125A	110	"DPL"	T2-R2	DC	CC3183			X	2	X	2				X	X	X	X	X	X		X	X	X		X			X						X		X	
C73RTB-6126A	110	"DPL"	T2-R2	TONE	CC3183			X	2	X	2				X	X	X	X	X	X		X	X	X		X	X	X	X	X							X	
C73RTB-6145A	110	"DPL"	T2-2R	DC	CC3183			X	2	2	0	0	0	X	X	X	X	X	X		X	X	2	2		X			X				X					X
C73RTB-6146A	110	"DPL"	T2-2R	TONE	CC3183			X	2	2	0	0	0	X	X	X	X	X	X		X	X	2	2		X	X		X	X						X		X

EPS-18075-C

RRIER FREQS.
EREOF). IN THIS
EIVER AND A
R.

PON CARRIER

NARY-CODED SQUELCH

ROL PE	FCC LICENSE DESIGNATION	TRANSMITTER	POWER AMPLIFIER, 60-WATT	POWER AMPLIFIER, 100-WATT	EXCITER-DRIVER	TRANSMITTER CHANNEL ELEMENT	RECEIVER	RECEIVER	RECEIVER CHANNEL ELEMENT	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF)	SHIFTED IF KIT	2-RECEIVER COUPLER	MISCELLANEOUS	SERVICE BOARD	ANTENNA SWITCH	HARDWARE, CABINET	CABINET	POWER SUPPLY (FORMERLY TPN1110-A)	STATION INTERCABLING (1-RECEIVER STATIONS)	STATION INTERCABLING (2-RECEIVER STATIONS)	"DIGITAL PRIVATE-LINE"	"DIGITAL PRIVATE-LINE" ENCODER	CODE PLUG	"DIGITAL PRIVATE-LINE" DECODER	"DIGITAL PRIVATE-LINE" ENCODER	REMOTE CONTROL	REMOTE CONTROL CHASSIS	GUARD TONE DECODER MODULE	STATION CONTROL MODULE	F1-"PL" TONE CONTROL MODULE	F1-"PL" DC TRANSFER MODULE	E2-R2 MUTE DC TRANSFER MODULE	C2-R2 DC TRANSFER MODULE	F2 TONE CONTROL MODULE	LINE DRIVER MODULE 2-WIRE 1-RECEIVER	LINE DRIVER MODULE 2-WIRE 2-RECEIVER
	MODEL		*TLD1700B	*TLD1690B	*TLD1710B	KXN1019B		*TRD1800BB	K1005A	KXN1022A	TLD8740A	TLN4758A		TLN8799A	TLN4295A	TLN4863A	THN6142A	TPN1110B	TKN6563A	TKN6571A		TTN6003A	TRN6005A	TLN5729A	TLN5725A		TCN1107A	TLN1245B	TLN4635B	TLN4638A	TLN4659A	TLN4660A	TLN4663A	TLN4665A	TLN4669A	TLN4670A
	CC3185		X		X	X		X	X					X	X	X	X	X	X			X	X	X			X		X		X				X	
NE	CC3185		X		X	X		X	X					X	X	X	X	X	X			X	X	X			X	X	X	X					X	
	CC3185		X		X	2		X	X					X	X	X	X	X	X			X	X	X			X		X			X			X	
NE	CC3185		X		X	2		X	X					X	X	X	X	X	X			X	X	X			X	X	X	X				X	X	
	CC3185		X		X	2		X	2					X	X	X	X	X	X			X	X	X			X		X				X		X	
NE	CC3185		X		X	2		X	2					X	X	X	X	X	X			X	X	X			X	X	X	X					X	
	CC3185		X		X	2		2	0	0	0	X		X	X	X	X	X		X		X	2	2			X		X			X				X
NE	CC3185		X		X	2		2	0	0	0	X		X	X	X	X	X		X		X	2	2			X	X	X	X				X		X
	△ △			X	X	X		X	X					X	X	X	X	X	X			X	X	X			X		X		X				X	
NE	△ △			X	X	X		X	X					X	X	X	X	X	X			X	X	X			X	X	X	X					X	
	△ △			X	X	2		X	X					X	X	X	X	X	X			X	X	X			X		X			X			X	
NE	△ △			X	X	2		X	X					X	X	X	X	X	X			X	X	X			X	X	X	X				X	X	
	△ △			X	X	2		X	2					X	X	X	X	X	X			X	X	X			X		X				X		X	
NE	△ △			X	X	2		X	2					X	X	X	X	X	X			X	X	X			X	X	X	X					X	
	△ △			X	X	2		2	0	0	0	X		X	X	X	X	X		X		X	2	2			X		X			X				X
NE	△ △			X	X	2		2	0	0	0	X		X	X	X	X	X		X		X	2	2			X	X	X	X				X		X

= CC3193
= CC318

FACTORY-INSTALLED OPTIONS

OPTION PLAN NUMBER OR OPTIONAL KIT NUMBER	DESCRIPTION	PUBLICATION REFERENCE	
		SECTION WITHIN THIS MANUAL	SEPARATE PUBLICATION
TONE REMOTE CONTROL STATION OPTIONS			
C56AA	Mute R2	-	68P81025E60
-OR-			
C63AB	Paging Control Module	-	68P81025E60
TLN1249A	Squelch Control Module	-	68P81025E60
-OR-			
TLN1251A	"PL" Control Module	-	68P81025E60
-OR-			
TLN1250A	Repeater Control Module	-	68P81025E60
TLN1252A	"Wild Card" Module	-	68P81025E60
DC REMOTE CONTROL STATION OPTIONS			
C63AA	Paging Module	-	68P81025E60
C143	Repeater Control Module	-	68P81025E60
C146	Add Tone Control	Various	-
C150	Base (RA) Operation	-	68P81105E08
DC REMOTE CONTROL AND TONE REMOTE CONTROL STATION OPTIONS			
C06	Hi-Stability Ch. Element (Xmtr)	Exciter	-
C08	Hi-Stability Ch. Element (Rcvr)	RF & IF	-
C12	RF Preamplifier	Receiver Miscellaneous	-
C27	46" Outdoor Cabinet	Installation	-
C28	120 V, 60 Hz & +12 V DC	-	68P81104E92
C29	Battery Saver & Alarm	-	68P81104E92
C31	Transmit Only Station (omit receiver and use TKN6634A Station Intercabling)	-	-
C32	12 V DC Power Interface	-	68P81105E31
C38	120/220/240 V, 50/60 Hz & +12 V DC	-	68P81104E92
C140	AND Squelch	Receiver Interconnect Unit	-
C144AA	4-Wire Audio (1-Rcvr)	-	68P81025E60
-OR-			
C144AB	4-Wire Audio (2-Rcvr)	-	68P81025E60
C145	TAC Encoder	-	68P81104E73
C149AT	Metering, Spkr. & Intercom	68P81033E28	-
C226	Service Intercom	-	68P81105E20
TLD6340A	Crystal Filter	-	68P81104A86 and 68P81104E36
TLN1181A	Single-Tone Decoder Module	-	68P81025E60
TLN1537A	Speaker & Intercom	-	68P81105E20
TLN4151A	Relay Kit	-	68P81025E60
TLN4636A	Time-Out Timer Module	-	68P81025E60

RCB "A" SUFFIX MODELS

MOTOROLA

MODEL CHART
FOR
"MICOR"® "COMPA-STATION"®
BASE STATIONS - CONTINUOUS DUTY
"DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH
132-174 MHz

CODE:

- ☒ = ONE ITEM SUPPLIED
- [2] = TWO ITEMS SUPPLIED
- [0] - TWO K1005A RCVR ELEMENTS SUPPLIED UNLESS RECEIVER CARRIER FREQS. ARE SEPARATED BY 11.7 MHz ±30 kHz (OR A SUB-MULTIPLE THEREOF). IN THIS CASE, A K1005A CHANNEL ELEMENT IS USED IN THE FIRST RECEIVER AND A KXN1022A CHANNEL ELEMENT IS USED IN THE SECOND RECEIVER.
- * = INDICATES A SERIES OF MODELS. SPECIFIC MODEL DEPENDS UPON CARRIER FREQUENCY.

STATION MODEL VARIABLES

NOTE

STATION MODELS ARE NOT AVAILABLE FOR ALL POSSIBLE LETTER AND NUMBER COMBINATIONS.

C53RTB-6105A

5 = DC REMOTE CONTROL
6 = TONE REMOTE CONTROL

0 = T1-R1
1 = T2-R1
2 = T2-R2
4 = T?-2R (2 RECEIVERS)

6 = DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH

5 = 60 W RF OUTPUT
6 = 90 W RF OUTPUT
7 = 100 W RF OUTPUT

STATION MODEL	RF OUTPUT POWER (WATTS)	TYPE OF SQUELCH	T1 = ONE XMIT FREQ. T2 = TWO XMIT FREQS. R1 = ONE RCVR FREQ. R2 = TWO RCVR FREQS. 2R = TWO RCVRS - ONE FREQ. EACH	CONTROL TYPE	FCC LICENSE DESIGNATION
C53RCB-6105A	60	"DPL"	T1-R1	DC	CC3185
C53RCB-6106A	60	"DPL"	T1-R1	TONE	CC3185
C53RCB-6115A	60	"DPL"	T2-R1	DC	CC3185
C53RCB-6116A	60	"DPL"	T2-R1	TONE	CC3185
C53RCB-6125A	60	"DPL"	T2-R2	DC	CC3185
C53RCB-6126A	60	"DPL"	T2-R2	TONE	CC3185
C53RCB-6145A	60	"DPL"	T2-2R	DC	CC3185
C53RCB-6146A	60	"DPL"	T2-2R	TONE	CC3185
C63/C73RCB-6105A	△	"DPL"	T1-R1	DC	△ △
C63/C73RCB-6106A	△	"DPL"	T1-R1	TONE	△ △
C63/C73RCB-6115A	△	"DPL"	T2-R1	DC	△ △
C63/C73RCB-6116A	△	"DPL"	T2-R1	TONE	△ △
C63/C73RCB-6125A	△	"DPL"	T2-R2	DC	△ △
C63/C73RCB-6126A	△	"DPL"	T2-R2	TONE	△ △
C63/C73RCB-6145A	△	"DPL"	T2-2R	DC	△ △
C63/C73RCB-6146A	△	"DPL"	T2-2R	TONE	△ △

DESCRIPTION	TRANSMITTER				RECEIVER					MISCELLANEOUS							"DIGITAL PRIVATE-LINE"				REMOTE CONTROL									
	POWER AMPLIFIER, 60-WATT	POWER AMPLIFIER, 100-WATT	EXCITER-DRIVER	TRANSMITTER CHANNEL ELEMENT	RECEIVER	RECEIVER CHANNEL ELEMENT	RECEIVER CHANNEL ELEMENT (FOR 2ND RECEIVER SHIFTED IF)	SHIFTED IF KIT	2-RECEIVER COUPLER	SERVICE BOARD	ANTENNA SWITCH	HARDWARE, CABINET	CABINET	POWER SUPPLY (FORMERLY TPN1110-A)	STATION INTERCABLING (1-RECEIVER STATIONS)	STATION INTERCABLING (2-RECEIVER STATIONS)	"DIGITAL PRIVATE-LINE" ENCODER	CODE PLUG	"DIGITAL PRIVATE-LINE" DECODER	"DIGITAL PRIVATE-LINE" ENCODER	REMOTE CONTROL CHASSIS	GUARD TONE DECODER MODULE	STATION CONTROL MODULE	F1-"PL" TONE CONTROL MODULE	F1-"PL" DC TRANSFER MODULE	E2-R2 MUTE DC TRANSFER MODULE	C2-R2 DC TRANSFER MODULE	F2 TONE CONTROL MODULE	LINE DRIVER MODULE 2-WIRE 1-RECEIVER	LINE DRIVER MODULE 2-WIRE 2-RECEIVER
MODEL	*TLD1700B	*TLD1690B	*TLD1710B	KXN1019B	*TRD1800BB	K1005A	KXN1022A	TLD8740A	TLN4758A	TLN8799A	TLN4295A	TLN4863A	THN6142A	TPN1110B	TKN6563A	TKN6571A	TTN6003A	TRN6005A	TLN5729A	TLN5725A	TCN1107A	TLN1245B	TLN4635B	TLN4638A	TLN4659A	TLN4662A	TLN4663A	TLN4665A	TLN4669A	TLN4670A
C53RCB-6105A	X		X	X	X	X				X	X	X	X	X	X		X	X	X		X		X		X				X	
C53RCB-6106A	X		X	X	X	X				X	X	X	X	X	X		X	X	X		X	X	X	X					X	
C53RCB-6115A	X		X	2	X	X				X	X	X	X	X	X		X	X	X		X		X			X			X	
C53RCB-6116A	X		X	2	X	X				X	X	X	X	X	X		X	X	X		X	X	X	X				X	X	
C53RCB-6125A	X		X	2	X	2				X	X	X	X	X	X		X	X	X		X		X				X		X	
C53RCB-6126A	X		X	2	X	2				X	X	X	X	X	X		X	X	X		X	X	X	X					X	
C53RCB-6145A	X		X	2	2	0	0	0	X	X	X	X	X	X		X	X	2	2		X		X			X				X
C53RCB-6146A	X		X	2	2	0	0	0	X	X	X	X	X	X		X	X	2	2		X	X	X	X				X		X
C63/C73RCB-6105A		X	X	X	X	X				X	X	X	X	X	X		X	X	X		X		X		X				X	
C63/C73RCB-6106A		X	X	X	X	X				X	X	X	X	X	X		X	X	X		X	X	X	X					X	
C63/C73RCB-6115A		X	X	2	X	X				X	X	X	X	X	X		X	X	X		X		X			X			X	
C63/C73RCB-6116A		X	X	2	X	X				X	X	X	X	X	X		X	X	X		X	X	X	X				X	X	
C63/C73RCB-6125A		X	X	2	X	2				X	X	X	X	X	X		X	X	X		X		X				X		X	
C63/C73RCB-6126A		X	X	2	X	2				X	X	X	X	X	X		X	X	X		X	X	X	X					X	
C63/C73RCB-6145A		X	X	2	2	0	0	0	X	X	X	X	X	X		X	X	2	2		X		X			X				X
C63/C73RCB-6146A		X	X	2	2	0	0	0	X	X	X	X	X	X		X	X	2	2		X	X	X	X				X		X

△ C63 SERIES = 90 W
C73 SERIES = 100 W

△△ C63 SERIES = CC3193
C73 SERIES = CC318

EPS-18076-C

FACTORY-INSTALLED OPTIONS

OPTION PLAN NUMBER OR OPTIONAL KIT NUMBER	DESCRIPTION	PUBLICATION REFERENCE	
		SECTION WITHIN THIS MANUAL	SEPARATE PUBLICATION
TONE REMOTE CONTROL STATION OPTIONS			
C56AA -OR-	Mute R2	-	68P81025E60
C63AB	Paging Control Module	-	68P81025E60
TLN1249A -OR-	Squelch Control Module	-	68P81025E60
TLN1251A -OR-	"PL" Control Module	-	68P81025E60
TLN1250A	Repeater Control Module	-	68P81025E60
TLN1252A	"Wild Card" Module	-	68P81025E60
DC REMOTE CONTROL STATION OPTIONS			
C63AA	Paging Module	-	68P81025E60
C143	Repeater Control Module	-	68P81025E60
C146	Add Tone Control	Various	-
C150	Base (RA) Operation	-	68P81105E08
DC REMOTE CONTROL AND TONE REMOTE CONTROL STATION OPTIONS			
C06	Hi-Stability Ch. Element (Xmtr)	Exciter	-
C08	Hi-Stability Ch. Element (Rcvr)	RF & IF	-
C12	RF Preamplifier	Receiver Miscellaneous	-
C27	46" Outdoor Cabinet	Installation	-
C28	120 V, 60 Hz & +12 V DC	-	68P81104E92
C29	Battery Saver & Alarm	-	68P81104E92
C31	Transmit Only Station (omit receiver and use TKN6634A Station Intercabling)	-	-
C32	12 V DC Power Interface	-	68P81105E31
C38	120/220/240 V, 50/60 Hz & +12 V DC	-	68P81104E92
C140	AND Squelch	Receiver Interconnect Unit	-
C144AA -OR-	4-Wire Audio (1-Rcvr)	-	68P81025E60
C144AB	4-Wire Audio (2-Rcvr)	-	68P81025E60
C145	TAC Encoder	-	68P81104E73
C149AT	Metering, Spkr. & Intercom	68P81033E28	-
C226	Service Intercom	-	68P81105E20
TLD6340A	Crystal Filter	-	68P81104A86 and 68P81104E36
TLN1181A	Single-Tone Decoder Module	-	68P81025E60
TLN1537A	Speaker & Intercom	-	68P81105E20
TLN4151A	Relay Kit	-	68P81025E60
TLN4636A	Time-Out Timer Module	-	68P81025E60

EPS-14745-D

DESCRIPTION 68P81017E23
INSTALLATION 68P81015E19
UPRIGHT OUTDOOR CABINET 68P81033E42
"COMPA–STATION" OUTDOOR CABINET 68P81033E46
MAINTENANCE 68P81017E24
ANTENNA SWITCH & MISCELLANEOUS HARDWARE 68P81014E92
FILTERS AND DUPLEXERS 68P81102E85
METERING AND INTERCOM 68P81033E28
STATION HARDWARE KIT 68P81033E23

TRANSMITTER INTERCONNECT BOARD 68P81033E78
TRANSMITTER INTRODUCTION 68P81016E64
TRANSMITTER INTERCONNECT UNIT 68P81026E69
EXCITER 68P81026E66
90/100/110 WATT POWER AMPLIFIER 68P81026E67
60 WATT POWER AMPLIFIER 68P81015E12
POWER CONTROL BOARD 68P81015E07
SIMPLEX "DIGITAL PRIVATE–LINE" ENCODER 68P81028E63
DUPLEX "DIGITAL PRIVATE–LINE" ENCODER 68P81028E64
"PRIVATE–LINE" ENCODER 68P81026E71
TRANSMITTER SHIELD UNIT 68P81015E21
TRANSMITTER HARDWARE KITS 68P81016E57
"PRIVATE–LINE" DISABLE CABLE KIT 68P81026E77

RECEIVER INTRODUCTION 68P81026E76
RECEIVER INTERCONNECT BOARD 68P81034E07
RECEIVER INTERCONNECT UNIT 68P81026E72
RECEIVER RF & IF BOARD 68P81015E02
RECEIVER AUDIO & SQUELCH BOARD 68P81025E79
AUDIO POWER AMPLIFIER 68P81014E97
"DIGITAL PRIVATE–LINE" DECODER 68P81028E66
"PRIVATE–LINE" DECODER 68P81026E73
RECEIVER SHIELD UNIT 68P81025E14
RF PREAMPLIFIER & CABLE 68P81016E33
2–RECEIVER COUPLER 68P81016E62
RECEIVER HARDWARE KIT 68P81034E24

POWER SUPPLY 68P81033E41
POWER SUPPLY 68P81020E44

SCHEMATIC DIAGRAM AND ALIGNMENT PROCEDURE 68P81103E49
RF INTERCABLING SECTION (INTERMITTENT DUTY STATIONS) 68P81016E97
RF INTERCABLING SECTION (CONTINUOUS DUTY STATIONS) 68P81016E98
RF INTERCABLING SECTION (CONTINUOUS DUTY STATION WITH UNIFIED CONTROL CHASSIS 68P81034E06

DESCRIPTION

132-174 MHz "MICOR" "COMPA-STATION" BASE REPEATER RADIO

1. ELECTRICAL FEATURES

Motorola "Micor" "Compa-Station" base and repeater FM two-way radios are fully solid-state units incorporating integrated circuits. Highly reliable reed switches are used for antenna switching in base stations.

All the advantages of solid-state and integrated circuit technilogy are utilized:

Reliability. -- Components have long life and require less maintenance.

Low current drain. -- Little power is consumed except when expending usable power such as receiving audio or transmitting rf signals. High efficiency means less power is consumed during these conditions.

Less heat. -- No filament heating is required, thus the radio operates cooler.

Small size. -- Small component size provides a high power radio in a small package, yet allows plenty of space for ease of servicing and room for many optional or future circuits to be added.

Low Voltage. -- The highest dc voltage required by the station, including the high power rf amplifiers, is 13.6 volts. This provides safety from electrical shock for the maintenance technician.

All stations require 60 Hz, 120-volt ac power and operate in the 132-174 MHz frequency range. Models are available for one-or two-frequency operation, and with transmitter power outputs of 60, 90, 100 and 110 watts. In all models, the receiver provides 10 watts of audio at less than 5% distortion into and 8-ohm load.

Unheated, temperature compensated, plug-in, oscillator modules (channel elements) are used for frequency control. Blowers and their related maintenance problems are eliminated by the use of heat sinks in the transmitter amplifier stages. Continuous duty transmitters can operate at full rated power indefinitely -- intermittent duty transmitters operate at full rated power under a 20% duty cycle or up to one minute ON immediately followed by four minutes OFF. Should an intermittent duty transmitter be keyed long enough to cause the station temperature to rise, a temperature sensing circuit in the transmitter reduces transmitter output power proportionally. This allows the station to remain "on-the-air" (at reduced power) even though the duty cycle of the station has been greatly exceeded. Continuous duty transmitters do not require and do not include this temperature power "cutback" feature.

2. MECHANICAL & SERVICING FEATURES

--Excellent Access - Virtually all components are mounted on circuit boards which are easily removed and replaced without unsoldering leads. The transmitter receiver, remote control unit and power supply are on individual "shelves".

--Few Wires - Broken and loose wire connections are greatly reduced as a source of trouble. A single 50-conductor "flat cable" interconnects the transmitter, receiver, and remote control unit.

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-- Modular Construction - Circuit boards can be removed and replaced in seconds. Spare circuit boards may be carried by a technician and defective boards replaced to quickly return stations to service.

-- Integrated Circuits - Fewer components and more reliable components mean less servicing.

-- Five Metering Receptacles - Metering receptacles in the exciter, power amplifier, power control board, receiver and remote control unit allow a Motorola portable test set to check over 20 major test points for rapid isolation of trouble. A microphone may be connected to the test set and the speaker in the test set used for operation of the station during testing. If optional built-in station metering is used, these functions can be checked at any time without the use of a portable test set.

-- Alignment - All receiver and transmitter alignment is performed from the front of the station. Crystal filters in the receiver i-f section eliminate most i-f alignment adjustments. Transmitter power output may be measured with optional built-in station metering or on a Motorola portable test set; no additional test equipment is required for transmitter alignment.

3. APPLICATION

Refer to CONTROL AND APPLICATION manual 68P81025E60, which accompanies this manual, for applications data.

4. "PRIVATE-LINE" OPERATION

This type of station is an improvement in FM two-way radio equipment especially when operating under crowded channel conditions. Several "Private-Line" systems can use the same rf carrier frequency in the same area if each system uses a different "Private-Line" code.

The transmitters are modulated by a continuous code signal in addition to the voice modulation. The receivers accept only correctly code-modulated signals and reject all others.

"Private-Line" coded squelch models also include noise-actuated squelch circuitry. This enables the operator to monitor the channel before transmissions ("PL" disable) and prevent interference with other users of the frequency.

The SQUELCH control has no effect on "PL" squelch sensitivity. In normal operation ("PL" ON), the receiver audio is activated when the on-frequency rf signal is FM modulated with the proper "PL" code to activate the "Private-Line" decoder.

Either one of two types of "Private-Line" coded squelch may be used; tone-coded or binary-coded. In "Private-Line" tone-coded squelch systems, 67-210 Hz tones are transmitted and then detected to unsquelch the audio path in a particular receiver or group of receivers. In "Digital Private-Line" binary-coded squelch systems, a 23-bit binary code word is transmitted continuously and detected to unsquelch the audio path in the receiver(s). Both the tone code and the binary code rate fall below the 300-3000 Hz voice frequency range used in radio communications equipment, therefore, the code signals are not heard by the operator.

5. DESCRIPTION OF ITEMS

a. Transmitter

The transmitter generates a frequency modulated rf carrier signal of 60-, 90-, 100-, or 110 watts depending upon the model. Refer to the following station block diagram for functional operation. The transmitter consists of the following items:

-- Channel Element - An unheated, temperature-compensated crystal oscillator plug-in module (channel element) provides a stable fundamental rf frequency for the transmitter. One channel element is used for each transmitter frequency. One- and two-frequency stations are available as standard remote models.

-- Exciter - The exciter provides the low power excitation signal for the transmitter. An "IDC" (Instantaneous Deviation Control) circuit amplifies and limits audio signals from the microphone (or line) to prevent over deviation. Amplified audio is applied to the channel element to produce direct fm modulation. Multipliers in the exciter multiply the channel element frequency 12 times to generate the carrier frequency signal(s) in the 132-174 MHz band.

-- Bandpass Filter - The bandpass filter couples 132-174 MHz signals from the exciter to the power amplifier and attenuates any harmonics outside this band.

-- Power Amplifier - The lower power output of the exciter is amplified to the rated power output of the transmitter in this solid-state power amplifier. Class C amplifiers are used which are cut off until signal drive is applied. A controlled amplifier stage regulates the amount of signal drive to prevent over-dissipation in the final amplifier stages. An input from the power control board controls the amount of gain.

-- Harmonic Filter - The low pass harmonic filter passes the 132-174 MHz band carrier signal and attenuates all harmonics from being radiated.

-- Power Control Board - The Power Control Board automatically and instantaneously regulates the transmitter output power. It maintains output power should source voltage vary, and progressively reduces power when temperature (intermittent duty models only) or VSWR increase. The output of the board is applied to the controlled amplifier stage in the power amplifier to regulate the amount of gain.

b. "Micor" "Compa-Station" "Sensitron" Receiver

The receiver accepts rf carrier signals on a specific channel in the 132-174 MHz range and provides voice audio in the 300-3000 Hz range. Refer to the station block diagram for functional operation. The receiver consists of the following items:

-- Channel Element - A plug-in crystal oscillator module (channel element) provides stable frequency control for each frequency of operation. One- and two-frequency stations are available as standard remote models.

-- Receiver RF & IF Board - The single-conversion superheterodyne FM receiver includes five rf preselectors (tuned cavities) and two crystal filters for excellent selectivity. Two integrated circuit i-f amplifiers and limiters give high sensitivity. A crystal discriminator demodulates the audio directly from an 11.7 MHz i-f signal. (Some 2-receiver stations may have a "shifted i-f" to 11.8 MHz when required.)

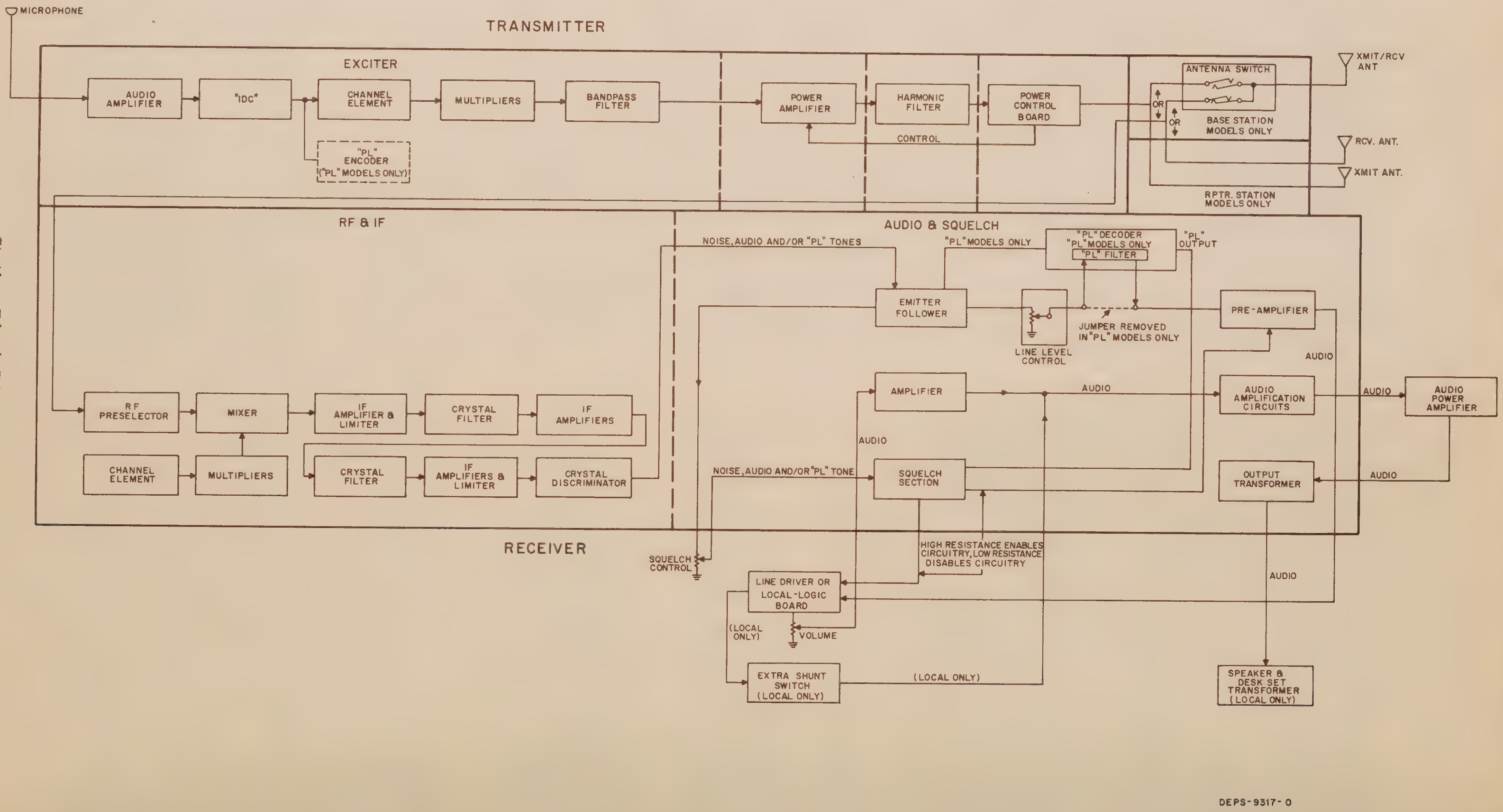
-- Audio & Squelch and Audio Power Amplifier Boards - Up to 10 watts of audio power at less than 5% distortion is provided by this circuit. When no messages are being received, the squelch circuit turns off the audio amplifiers to eliminate annoying noise in the speaker. A squelch tail eliminator circuit prevents the noise burst at the end of a message for strong signals. For weak signals, the circuit is automatically inhibited to prevent loss of portions of messages. The audio power amplifier transistors are mounted on a separate circuit board and aluminum heat sink for good heat dissipation.

With 2-receiver stations, a 2-receiver coupler is used. This unit permits two receivers to operate from the same antenna.

An optional receiver rf preamplifier is also available to improve receiver sensitivity by 6 dB to .125 microvolt. When used with 2-receiver stations, this more than makes up for the half power loss in each "leg" of the 2-receiver coupler.

c. Power Supply

The power supply provides all the voltage necessary for operating the station.


MICROPHONE
TRANSMITTER
EXCITER
AUDIO AMPLIFIER
"IDC"
CHANNEL ELEMENT
MULTIPLIERS
BANDPASS FILTER
"PL" ENCODER ("PL" MODELS ONLY)
POWER AMPLIFIER
HARMONIC FILTER
POWER CONTROL BOARD
CONTROL
ANTENNA SWITCH
OR
OR
BASE STATION MODELS ONLY
RPTR. STATION MODELS ONLY
XMIT/RCV ANT
RCV. ANT.
XMIT ANT.
RF & IF
RF PRESELECTOR
MIXER
IF AMPLIFIER & LIMITER
CRYSTAL FILTER
IF AMPLIFIERS
CHANNEL ELEMENT
MULTIPLIERS
CRYSTAL FILTER
IF AMPLIFIERS & LIMITER
CRYSTAL DISCRIMINATOR
AUDIO & SQUELCH
NOISE, AUDIO AND/OR "PL" TONES
"PL" MODELS ONLY
"PL" DECODER "PL" MODELS ONLY
"PL" FILTER
"PL" OUTPUT
EMITTER FOLLOWER
LINE LEVEL CONTROL
JUMPER REMOVED IN "PL" MODELS ONLY
PRE-AMPLIFIER
AUDIO
AMPLIFIER
AUDIO
AUDIO AMPLIFICATION CIRCUITS
AUDIO
AUDIO POWER AMPLIFIER
AUDIO
NOISE, AUDIO AND/OR "PL" TONE
SQUELCH SECTION
OUTPUT TRANSFORMER
AUDIO
RECEIVER
SQUELCH CONTROL
HIGH RESISTANCE ENABLES CIRCUITRY, LOW RESISTANCE DISABLES CIRCUITRY
LINE DRIVER OR LOCAL-LOGIC BOARD
(LOCAL ONLY)
VOLUME
EXTRA SHUNT SWITCH (LOCAL ONLY)
(LOCAL ONLY)
AUDIO
SPEAKER & DESK SET TRANSFORMER (LOCAL ONLY)
DEPS-9317-0

Station Block Diagram

INSTALLATION

IMPORTANT

FCC regulations state that:

1. Radio transmitters may be tuned or adjusted only by persons holding a 1st or 2nd class commercial radiotelephone operator's license or by personnel working under their immediate supervision.

2. The rf power output of a radio transmitter shall be no more than that required for satisfactory technical operation considering the area to be covered and local conditions.

3. Frequency, deviation and power of a base station transmitter must be checked before it is placed in service and rechecked every year thereafter.

REMEMBER

The efficiency of the equipment depends upon a good installation.

1. INSPECTION

Inspect the equipment thoroughly as soon as possible after delivery. If any part of the equipment has been damaged in transit, report the extent of damage to the transportation company immediately.

2. PLANNING THE INSTALLATION

Since a good installation is so important to obtain the best possible performance of the communications system, carefully plan the installation before actual work is started. Location of the station in relation to power, control lines, the antenna, convenience and access for servicing should be considered. The cabinet dimensional detail diagrams show the size of the various cabinets for planning the space requirements. Read the entire procedure and the many suggestions offered to help you plan your installation. Make sure all tools, equipment and facilities are available when the installation is begun.

3. VENTILATION

The radio equipment is operated without forced ventilation. The cabinets have vents which allow outside air to be drawn in through an opening in the bottom of the doors and expelled through an opening in the top of the doors. The heated air rising in the cabinet causes a natural draft. Therefore, it is essential that the openings be kept free of obstructions so the air flow will not be restricted. The vents on outdoor type cabinets provide necessary station ventilation and in addition prevent rain, snow, etc. from entering the cabinet.

4. INSTALLATION OF CABINET

a. General

The cabinet should be located on a solid, level surface convenient to the power source and the transmission line. The transmission line should be kept as short as possible to minimize line losses.

5. CONNECTIONS

All antenna, power and control lines may be brought through the notch at the bottom of the rear door (indoor "Compa-Station" cabinets). Any or all of these lines may be brought out through the bottom, side or top of the cabinet, if desired, by drilling a hole in the cabinet at the desired position.

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Be careful to determine internal clearance before drilling access holes. A 3/4-inch diameter hole allows conduit to be installed for cable runs. If conduit is not used, install rubber grommets in the holes to protect the cables. For outdoor installations, the entrance point(s) must be sealed and made as weatherproof as possible.

a. Antenna

Installation of the antennas and transmission lines should be made prior to installation of the station. The antennas and transmission lines are not supplied as part of the station equipment; therefore, antenna installation instructions are not included herein. Follow the instructions shipped with the antennas for applicable antenna installation procedures.

In its primary application, the station is used for communication with mobile stations. Antennas exhibiting omni-directional characteristics are desirable. However, if the station is located at the outer perimeter of a communications area or if it is to be used for communications with fixed stations, antennas with specific directional characteristics may be more suitable. FCC requirements may also dictate the type of antenna to be used.

For base stations, the antenna coaxial cable connects to the antenna relay with a UHF type connector. The antenna relay is located on the left end of the receiver chassis in the rear of the station, with the antenna connection pointed downward (see Figure 1). If the antenna cable is to be routed out the top of the cabinet, the antenna relay can be moved to the transmitter or exciter chassis and inverted so that the antenna connection is pointed upward.

For models using unified control chassis, the antenna relay is located at the rear of the transmitter portion (see Figure 1).

For repeater stations, one or two antenna(s) may be used. Two antennas are required if the station is not equipped with a duplexer unit -- one for the transmitter and the other for the receiver. Connect the transmitter antenna coaxial cable to the BNC type connector on the right of the transmitter chassis in the front of the station. Connect the receiver antenna coaxial cable to the BNC type connector on the receiver chassis. Only one antenna is required if the station is equipped with a duplexer unit. Connect the antenna coaxial cable to the duplexer unit with a UHF type connector. This connector is located on top of the duplexer unit and is reached from the rear of the station.

b. Jumpers to Set Before Operation

Many station modes of operation are determined by jumper connections at the time of installation and are described in the following paragraphs.

Additional jumpers used with the station are identified and described in applicable sections elsewhere within this instruction manual.

(1) Time-Out Timer Module

Base stations or repeaters equipped with a time-out timer module prevent unintentional continuous transmission. The timing jumpers on the module may be connected for 1/2, 1, 2, 4 or 8 minute operation. In repeaters, the time-out timer will reset each time a new input signal arrives at the station, whether or not the dropout delay generator has shut off the transmitter. Repeater time-out time and line transmit time periods may be selected independently with the repeater select jumper and the line select jumper.

(2) Squelch Gate

In repeater stations, the dropout delay generator in the squelch gate module prevents the transmitter from shutting off during loss or excessive fade of input signal for the length of time preset. The jumper can be set for 0, 1, 2, 4 or 8 seconds operation.

(3) Two-Receiver Stations

Stations equipped with two receivers can be connected for receiver #1 priority or receiver #2 priority if desired. A signal received on the priority receiver automatically mutes the other receiver. These jumpers are located on the line driver module.

Receiver #1 priority - JU18 OUT
JU24 IN
Receiver #2 priority - JU18 IN
JU24 OUT

Jumpers in the line driver module also allow receiver #2 to be partially muted (audio attenuation) if desired, rather than the full muting as shipped from the factory. Attenuation of 10 dB, 20 dB or 30 dB in respect to the unmuted condition are possible by jumper connections as follows.

10 dB attenuation - JU25, 26 IN
JU27 OUT
20 dB attenuation - JU25 IN
JU26, 27 OUT
30 dB attenuation - JU25, 26 & 27 OUT

Receiver #2 mute attenuation is a standard feature of DC controlled stations and optional on Tone Control.

c. Power Connections

All stations may operate a 20-ampere, 120 volt 60 Hz ac power input. This circuit should be installed in accordance with local electrical codes.

The primary ac power line can be installed and terminated near the station site before installing the station cabinet. If the 3-wire line cord (supplied with the station) is used, the ac power line should be terminated with a 3-contact receptacle to accommodate the plug on the power cord.

Connect the three-wire ac line cord to the ac outlet or "turn on" the power to the permanent connection. A power on-off switch is not provided in the equipment, therefore, with power applied, the equipment is in an operative condition.

The station fuse controls all power to the station except ac power to the outlet in the power supply.

WARNING

If a three wire grounded primary ac power source is not available the radio equipment must be grounded separately to prevent electrical shock hazards and provide lightning protection.

d. Control Line

The station can be controlled from a remote point over wire line circuits. Simplex audio is used, meaning that the remote point can send audio to the station or receive audio from the station, but not both at the same time. Therefore, a single audio pair will suffice. For dc remote control operation, the wire line must provide dc continuity for carrying the dc control currents. This must be the same pair that carries the transmit audio. For tone remote control operation the audio pair also carries the audio control tones.

Four-wire audio operation, wherein transmitter audio and receiver audio are carried on separate wire pairs, is possible with the optional Line Driver/4-wire, 2-receiver Audio Module (this module is also used in 4-wire, single receiver application). In such operation, line 1 is the transmit pair and line 2 is the receive pair.

In stations with two receivers and four-wire audio, jumpers can be arranged to use line 2 to carry the audio from receiver #2 only if desired.

The audio wire line(s) must meet the following specifications for acceptable radio communications. For stations using both tone and dc control, the lines must meet both specifications.

TONE REMOTE CONTROL OPERATION
AUDIO LINE REQUIREMENTS

PHONE-COMPANY SPECIFIED MAXIMUM INPUT	MAXIMUM PHONE LINE LOSS USABLE WITH REMOTELY-CONTROLLED RADIO
+8 vu (14 dBm)	32 dB
0 vu (6 dBm)	24 dB
-8 vu (-2 dBm)	16 dB

FREQUENCY RESPONSE: 500 to 2500 Hz
FREQUENCY TRANSLATION ERROR: ±10 Hz MAX.
IMPEDANCE: 600-OHM BALANCED LINE
SIGNAL-TO-NOISE: 35 dB MIN.

DC REMOTE CONTROL OPERATION

AUDIO LINE REQUIREMENTS

1. FREQUENCY RESPONSE: 500 TO 2500 Hz
2. IMPEDANCE: 600-OHM BALANCED LINE

DC LINE REQUIREMENTS

1. DC RESISTANCE 0 TO 8000 OHMS.
2. MUST HAVE DC CONTINUITY.

CHARACTERISTICS OF LEASED TELEPHONE LINES SHOULD BE CHECKED WITH THE COMPANY PROVIDING THE SERVICE PER THE ABOVE REQUIREMENTS.

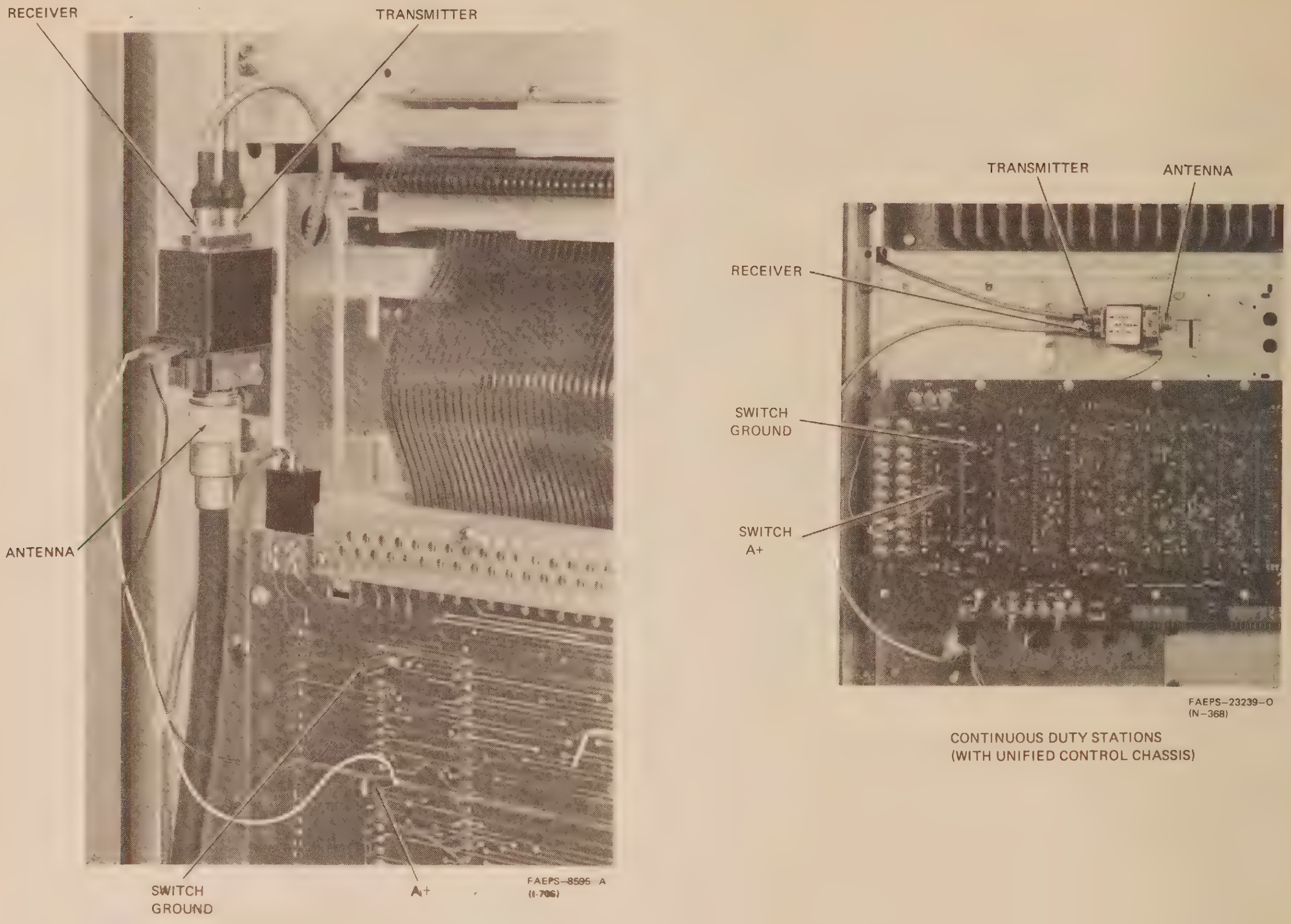
The control line may be installed prior to installation of the cabinet and terminated near the location chosen for the station. Conduit or two-wire cable can be used from this termination to the station cabinet.

Connect the 600-ohm lines to the screw terminals on the rear of the remote control chassis interconnect board as shown in Figure 2 (in 2-wire applications, use line 1 connections).

6. PRE-OPERATIONAL ADJUSTMENTS

a. General Information

Most telephone companies limit the maximum signal power which they will allow on their lines. This maximum is specified with respect


RECEIVER
TRANSMITTER
ANTENNA
SWITCH
GROUND
A+
FAEPS-8595 A
(I-706)
TRANSMITTER
ANTENNA
RECEIVER
SWITCH
GROUND
SWITCH
A+
FAEPS-23239-0
(N-368)

CONTINUOUS DUTY STATIONS
(WITH UNIFIED CONTROL CHASSIS)

INTERMITTENT DUTY STATIONS

Figure 1. Antenna Relay Location

to a specified Test Level Point (TLP) at full system deviation (±5 kHz). The maximum signal power usually specified (in the U.S.A.) is -13 dB average below the TLP. The -13 dB average is defined as the peak to average ratio of a speech signal over a 3-second period. For purposes of these instructions, the TLP is assumed to be 0 dBm for voice and -16 dBm for multiplex unless otherwise specified.

Since it is difficult (if not impossible) to measure speech power, a test tone (sine wave) is used for setting line levels. A 1000 Hz tone set for 60% of full system deviation (±3.0 kHz) is recommended for setting the line level.

b. DC Line Current

When the dc control line is initially connected, it must be tested to assure that its loop resistance is low enough to allow sufficient current for remote operation. Use the following test procedure:

(1) Connect a dc millimeter in series with the dc control line.

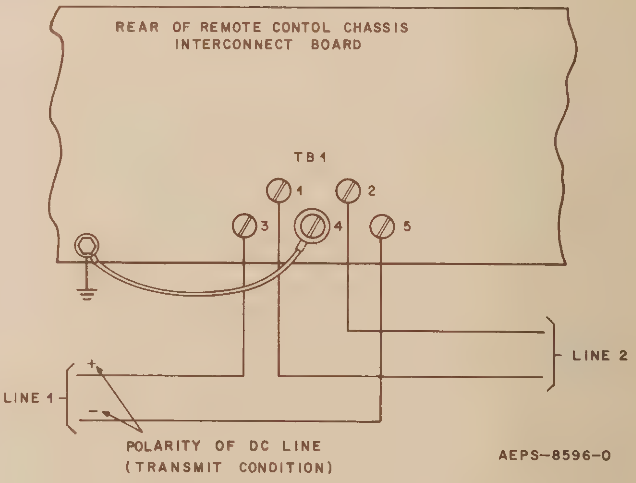

REAR OF REMOTE CONTOL CHASSIS
INTERCONNECT BOARD
TB1
1
2
3
4
5
LINE 2
LINE 1
+
−
POLARITY OF DC LINE
(TRANSMIT CONDITION)
AEPS-8596-0

Figure 2. Control Line Connections

(2) Press the push-to-talk switch at the remote control console.

(3) The current must be at least +5.5 mA to key the transmitter; at least +10 mA for two-frequency transmitters. Check the current polarity and note whether the station is actually

keyed; reverse the polarity of the line connections if necessary. Adjust the remote control console for F1 line current until +5.5 mA is achieved. For a two-frequency transmitter, adjust the remote control console for F2 line current of 10 to 12 mA. If the loop resistance is too high, the line current with the console set for maximum current will not key the transmitter. There are two alternatives:

--Use a lower resistance pair of lines.

--Use an alternate pair of lines with lower resistance to carry dc current only. This pair need not have good audio loss or response characteristics.

Adjust the line current for "Private-Line" disable at the remote control console for -2.5 mA, if a "Private-Line" model is being adjusted.

c. Control Tone Levels

The control tone levels for the remotely controlled functions are adjusted at the remote control console. No additional adjustments are required.

d. Audio Level Settings

(1) General

(a) A local speaker at the station may be used for testing and level settings. If the station is equipped with optional built-in metering, it includes a local speaker. If not, the speaker in a Motorola portable test set may be used by connecting the test set with "Micor" adapter to the control receptacle (J3) on the remote control interconnect board. Otherwise, a "Micor" mobile speaker can be connected to the local speaker pins (J4-1 and -12 of remote control interconnect board). The receiver VOLUME control sets the audio level at the local speaker only.

(b) Exciter audio should be measured at the microphone input to the exciter (J902-12 and -19) and adjusted for the sensitivity value stamped on the exciter. If the station is equipped with optional built-in metering, this may be measured at pins 1 and 2 of the local microphone jack. If not, it may be measured at J4-15 and -14 of remote control interconnect board or on the portable test set.

(c) "Private-Line" receivers must be PL disabled during adjustments with the PL DISABLE switch on the station control module, In "Private-Line" repeaters, the squelch gate must also be set for carrier squelch operation during adjustments by connecting jumper JU14 to the active pin and JU15 to the dummy pin. Be sure to return the jumpers to the PL condition after adjustments are complete.

(d) If the station is equipped with a single-tone decoder module for repeater access unplug the single-tone decoder during adjustments.

(2) Repeater Level Setting

(a) Set the receiver SQUELCH control at squelch threshold.

(b) Inject an on-frequency carrier signal into the receiver antenna input. Adjust the signal level for 20 dB quieting.

(c) Adjust the REPEATER SQUELCH KEY control (squelch gate module) so the transmitter just keys.

(d) Modulate the receiver input with a 1000-Hz tone at ±5 kHz deviation. Adjust the REPEATER LEVEL control (squelch gate module) so the exciter audio input is the value stamped on the exciter (modulator sensitivity +6 dB.

(3) Wire Line Controlled Base Stations and Repeaters

Determine the maximum allowable audio level permitted on the lines (usually 0 dBm) and set line audio levels to this amplitude.

As mentioned previously, the lines used to carry audio have an ac impedance of 600 ohms. The amplitude of signals is most conveniently measured in dBm. Zero dBm is equal to 1 milliwatt across 600 ohms. Most audio voltmeter, such as the Motorola Transistorized AC Voltmeter, are calibrated to read directly in dBm when measuring across a 600-ohm impedance. Never use a volt-ohm meter or a multimeter.

(a) Apply a 1000-Hz test tone at the remote control console which will drive the amplifier into compression. Adjust the output of the remote control console for +14 dBm (or maximum allowable audio level on the transmit audio line as it leaves to remote control console. If the level at TB1-3 & 5 (TB1-1 and -3 on unified chassis) is above 0 dBm remove JU1 on the station control module.

(b) Adjust the XCTR LEVEL control (station control module) so the exciter audio input equals the value stamped on the exciter (modulator sensitivity plus 6 dB).

(c) Remove the transmit audio tone.

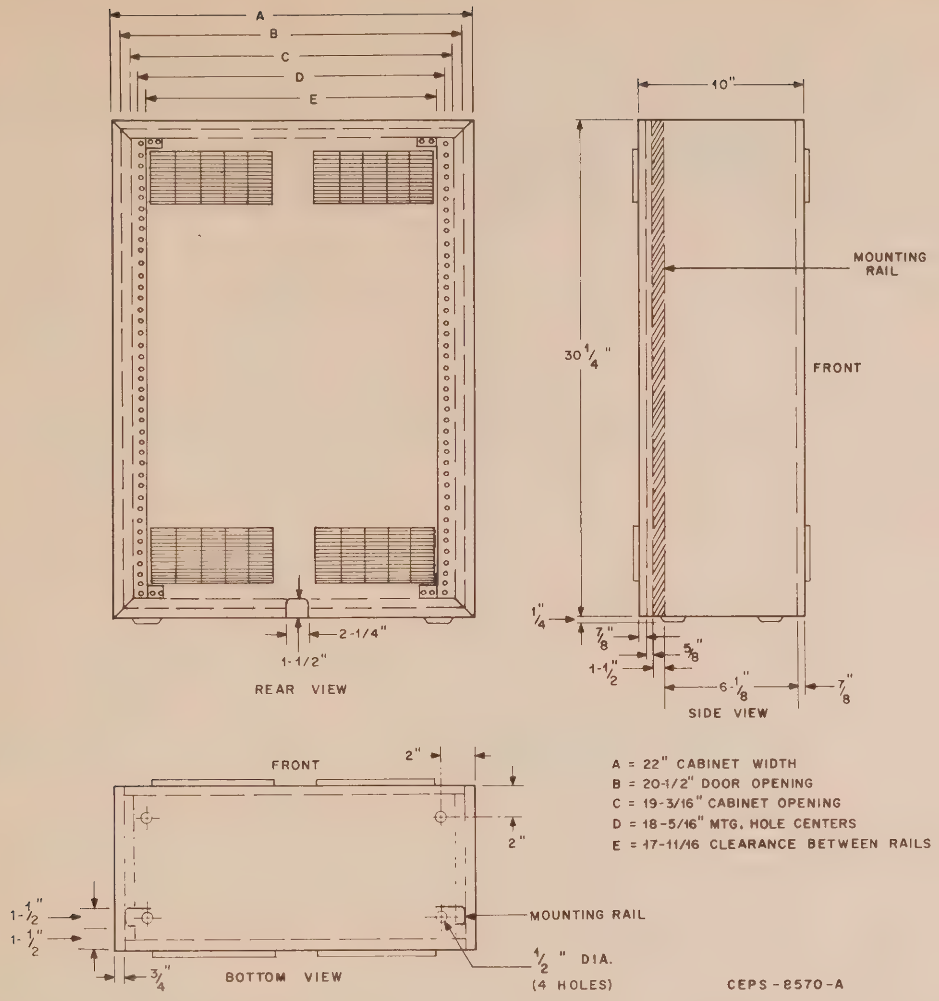
(d) Set the receiver SQUELCH control for squelch threshold.

(e) Inject a 1000 uV carrier frequency signal at the antenna input of the receiver. Modulate the signal with a 1000 Hz tone at ±3 kHz deviation.

(f) Adjust the LINE 1 OUTPUT (line driver module) for 4.4 dBm below the specified TLP as measured with an rms voltmeter across the line 1 terminals at TB1-3 and -5 (TB1-1 and -3 on unified chassis). If four-wire audio operation is used, with the receiver output applied to line 2, adjust the LINE 2 OUTPUT control while measuring across the line 2 terminals at TB1-1 and -2 (TB1-6 and -4 on unified chassis).

If the station has two receivers, both feeding to line 1, set the LINE 1 OUTPUT control as specified with a ±5 kHz modulated carrier signal injected into receiver 1. Next, inject a ±5 kHz modulated carrier into receiver 2. If the line output on the voltmeter changes by more than 2 dBm, readjust the potentiometer on the receiver 2 audio and squelch board to match the receiver 1 reading.

If the station has two receivers, each on a different line, adjust LINE 1 OUTPUT with a modulated carrier injected into receiver 1, and adjust LINE 2 OUTPUT with a modulated carrier injected into receiver 2.



A = 22" CABINET WIDTH
B = 20-1/2" DOOR OPENING
C = 19-3/16" CABINET OPENING
D = 18-5/16" MTG. HOLE CENTERS
E = 17-11/16 CLEARANCE BETWEEN RAILS

PARTS LIST

TLN4859A Cabinet Hardware Kit (intermittent-duty repeater stations) PL-1789-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		NON-REFERENCED ITEMS
	2D82360B07	SPEED NUT; 22 req'd.
	3S135038	SCREW, tapping; 14 x 3/4" Phillips pan head; 22 req'd.
	13B813618	DECAL; patents
	54A850440	LABEL; FCC license designation
	54A84857B01	LABEL; power output calibration
	54A83040C01	LABEL; exciter audio
	54A842366	LABEL; replacement parts
	33B83751C01	NAMEPLATE; model number
	15C84255D01	COVER; top
	15C84254D01	COVER; rear
	15C84253D01	COVER; front; receiver
	3S136890	SCREW, machine; 4-40 x 1/4" plain hex head; 20 req'd.
	3A84141D01	SCREW; special type; 16 req'd.
	15D84353D01	COVER; bottom; transmitter
	15D84352D01	COVER; rear; transmitter
	15D84301E01	COVER; front; transmitter, h. b.

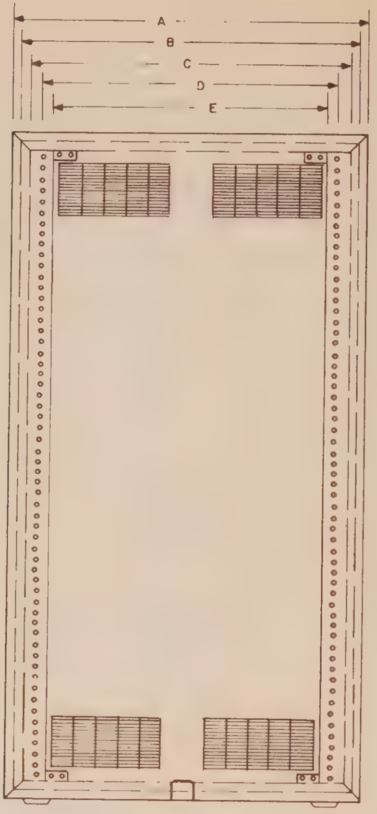
TLN4735A Cabinet Hardware Kit (Base Stations) PL-1788-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		NON-REFERENCED ITEMS
	2D82360B07	SPEED NUT (22 required)
	3S135038	SCREW, tapping: No. 14 x 3/4" Phillips pan head (22 required)
	7B84266D01	BRACKET (antenna relay mounting)
	3S131965	SCREW, tapping: 8-32 x 3/8" Phillips hex head with captive lockwasher (2 required)
	3S135841	SCREW, tapping: 6-32 x 1" Phillips hex head (2 required)
	13B813618	DECAL (patents)
	54A850440	LABEL (FCC license designation)
	54A84857B01	LABEL (power output calibration)
	54A83040C01	LABEL (exciter audio)
	54A842366	LABEL (replacement parts)
	33B83751C01	NAMEPLATE (model number)

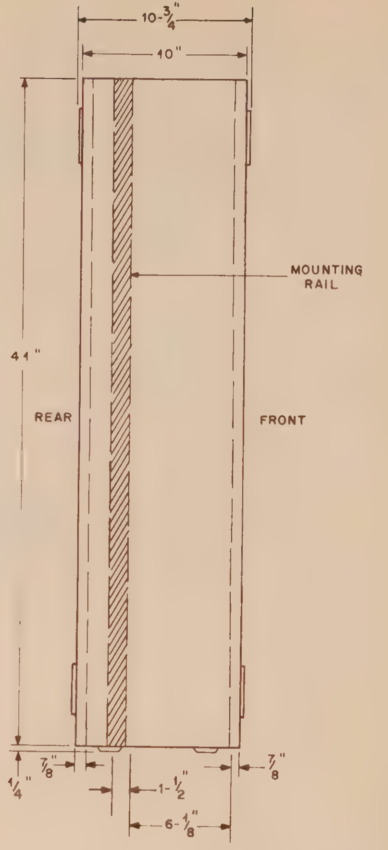
THN6141A Cabinet Kit (intermittent-duty base & repeater stations) PL-1787-0

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		NON-REFERENCED ITEMS
	15E84107D01	CABINET (30")
	13C84430D01	DOOR VENT (8 required)
	2S10101A55	SPEED NUT (48 required)

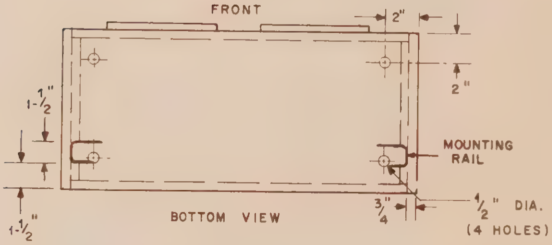
Intermittent Duty Stations
Cabinet Dimensional Detail & Parts List
Motorola No. PEPS-92221-A
6/23/78-UP



REAR VIEW



SIDE VIEW



BOTTOM VIEW

A = 22" CABINET WIDTH
B = 20-1/2" DOOR OPENING
C = 19-3/16" CABINET OPENING
D = 18-5/16" MTG. HOLE CENTERS
E = 17-11/16" CLEARANCE BETWEEN RAILS

CEPS-8571-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

PARTS LIST

TLN4861A Cabinet Hardware Kit
(continuous-duty repeater stations) PL-1792-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		NON-REFERENCED ITEMS
	2D82360B07	SPEED NUT; 26 req'd.
	3S135038	SCREW, tapping; 14 x 3/4" Phillips pan head; 26 req'd.
	13B813618	DECAL; patents
	54A850440	LABEL; FCC license designation
	54A84857B01	LABEL; power output calibration
	54A83040C01	LABEL; exciter audio
	54A842366	LABEL; replacement parts
	33B83751C01	NAMEPLATE; model number
	15C84255D01	COVER; top; receiver
	15C84254D01	COVER; rear; receiver
	15C84253D01	COVER; front; receiver
	3S136890	SCREW, machine; 4-40 x 1/4" Phillips hex head; 20 req'd.
	3A84141D01	SCREW; special type; 8 req'd.

TLN4863A Cabinet Hardware Kit
(Continuous Duty Base Stations) PL-1791-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		NON-REFERENCED ITEMS
	2D82360B07	SPEED NUT (26 req'd.)
	3S135038	SCREW, tapping: No. 14 x 3/4" Phillips pan head (26 req'd.)
	13B813618	DECAL (patents)
	54A850440	LABEL(FCC license designation)
	54A84857B01	LABEL (power output calibration)
	54A83040C01	LABEL (exciter audio)
	54A842366	LABEL (replacement parts)
	33B83751C01	NAMEPLATE (model number)

THN6142A Cabinet Kit
(continuous-duty base & repeater stations) PL-1790-0

		NON-REFERENCED ITEMS
	15B84143D01	CABINET (41")
	13C84430D01	DOOR VENT (8 required)
	2S10101A55	SPEED NUT (48 required)

Continuous Duty Stations
Cabinet Dimensional Detail & Parts List
Motorola No. PEPS-9222-A
6/23/78

MOTOROLA

INSTRUCTION MANUAL REVISION

SMR-3819

Supersedes SMR-3698 and
SMR-3779

GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

INSTRUCTION MANUALS AFFECTED:

68P81025E60-D	"MICOR"® Base and Repeater Stations Control and Applications Manual
68P81034E25-A	"MICOR" Base and Repeater Stations Digital Voice Protection System 406-512 MHz
68P81036E40-A	"MICOR" Base and Repeater Stations Digital Voice Protection System 132-174 MHz
68P81025E55-B	"MICOR" Community Repeater 406-512 MHz
68P81031E95-A	"MICOR" Community Repeater 806-821 MHz Receive 851-866 MHz Transmit

REVISION DETAILS:

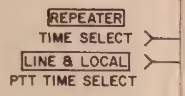
This revision covers a new Model TRN8684B CMOS Time-Out-Timer which replaces the Model TLN4636A Time-Out-Timer. Insert the attached 68P81044E69-O Instruction Section in place of the 68P81015E41 section in your manual.

NOTE

All repeater station model charts should be changed to include the replacement model number.

ATTACHMENT:

TRN8684B CMOS Time-Out-Timer 68P81044E69-O



PPLICATIONS ONLY)

Q12	Q13	Q14	DISABLE
2 MIN.	4 MIN.	8 MIN.	INFINITY
204 SEC OR 3.4 MIN	408 SEC OR 6.8 MIN	816 SEC OR 13.6 MIN	INFINITY
72 SEC OR 1.2 MIN	144 SEC OR 2.4 MIN	288 SEC OR 4.8 MIN	INFINITY

RED TIME—OUT TIME IN SECONDS, N IS THE
CILLATOR FREQUENCY IN HERTZ.

NCY NEEDED TO PRODUCE A 3 MINUTE T—O—T
H OUTPUT MUST BE USED — Q12. SECOND,
CALCULATE THE REQUIRED FREQUENCY:

)48) = 11.4 HZ

60)] X (2^{13-1}) = 13.7 HZ

BEPS—27258—A

temporary jumper to pins 6 and 1

temporary jumper to pins 22 and 1

oth time selection jumpers to "1/2
dule pin 4 should go low after 1/2

ive output is not located, check con-
uity of plating for opens and shorts.

CMOS TIME-OUT-TIMER

MODEL TRN8684B

FUNCTION

Limits the period of time the transmitter may be keyed.

parts list

TRN8684B CMOS Time-Out-Timer PL-6821-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed:
C1	8-82096J21	0.33 uF ± 10%; 250 V
C2	21-82372C01	0.1 uF +80-20%; 25 V
C3	21-832501	0.01 uF +60-40%; 250 V
		transistor: (see note)
Q1	48-869642	NPN; silicon
		resistor, fixed: ± 10%; 1/4 W: unless otherwise stated
R1	6-124A95	82k ± 5%
R2	6-124B08	270k ± 5%
R3	6-124C89	47k
R4-7	6-124C97	100k
R8	6-124C89	47k (used for special applications only)
R9	18-84944C07	var. 100k ± 20%; 0.1 W (used for special applications only)
R10, 11	6-124C89	47k
R12	6-124A73	10k
		integrated circuit: (see note)
U1	51-82884L42	type MC14020B (14-bit binary counter)
U2	51-82884L05	type MC14011B (Quad, 2-input NAND gate)
U3	51-82884L04	type MC14001B (Quad, 2-input NOR gate)
U4	51-82884L02	type MC14049B (HEX inverter/buffer)
	non-referenced items	
	29-83167C01	TERMINAL, strain relief; 2 used
	39-10184A24	CONTACT, receptacle; 2 used
	9-83011H01	RECEPTACLE, board mounting; 9 used
	39-10184A10	CONTACT, plug; 12 used
	43-865080	BUSHING, threaded; 2 used
	3-134212	SCREW, tapping: 4-40 x 5/16"; 2 used
	45-83914G01	GUIDE, card; 2 used
	64-83125L01	PANEL, screened

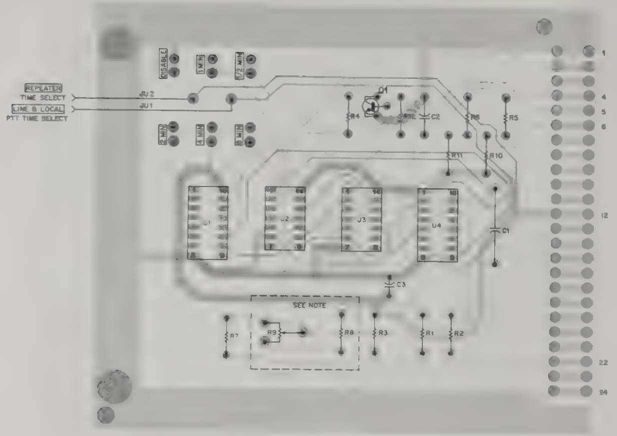
note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

CMOS TIME-OUT-TIMER

MODEL TRN8684B

FUNCTION

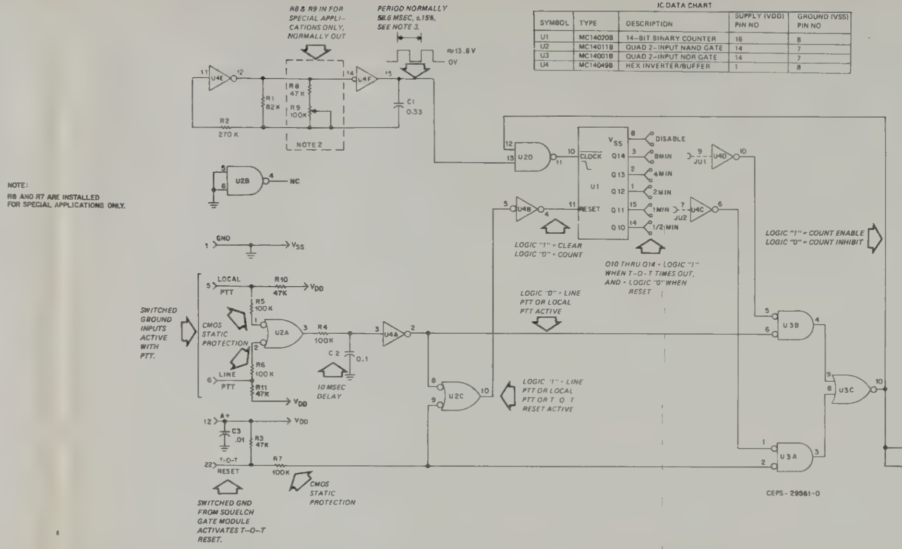
Limits the period of time the transmitter may be keyed.


REPEATER
TIME SELECT
LINE & LOCAL
PTT TIME SELECT
JU2
JU1
DISABLE
1 MIN
1/2 MIN
2 MIN
4 MIN
8 MIN
Q1
R4
R2
C2
R6
R5
R11
R10
U1
U2
U3
U4
C1
C3
SEE NOTE
R7
R9
R8
R3
R1
R2
1
4
5
6
12
22
24

SHOWN FROM COMPONENT SIDE

COMPONENT SIDE BD-CEPS-29562-0
SOLDER SIDE BD-CEPS-29563-0
OL-CEPS-29564-0

NOTE:
R6 AND R7 ARE INSTALLED FOR SPECIAL APPLICATIONS ONLY.


R8 & R9 IN FOR SPECIAL APPLICATIONS ONLY, NORMALLY OUT
PERIOD NORMALLY 58.6 MSEC, ±15%, SEE NOTE 3.
≈13.8 V
0V
U4E
U4F
R1 82K
R2 270 K
R8 47 K
R9 100K
NOTE 2
C1 0.33
U2B
NC
GND
VSS
U2D
CLOCK
RESET
U1
VSS
Q14
Q13
Q12
Q11
Q10
DISABLE
8MIN
4MIN
2MIN
1MIN
1/2 MIN
JU1
JU2
U4D
U4C
U4B
LOGIC "1" = CLEAR
LOGIC "0" = COUNT
Q10 THRU Q14 = LOGIC "1" WHEN T-O-T TIMES OUT, AND = LOGIC "0" WHEN RESET
LOGIC "1" = COUNT ENABLE
LOGIC "0" = COUNT INHIBIT
LOGIC "0" = LINE PTT OR LOCAL PTT ACTIVE
SWITCHED GROUND INPUTS ACTIVE WITH PTT.
LOCAL PTT
LINE PTT
R10 47K
R5 100K
R6 100K
R11 47K
VDD
CMOS STATIC PROTECTION
U2A
R4 100K
C2 0.1
10 MSEC DELAY
U4A
U2C
LOGIC "1" = LINE PTT OR LOCAL PTT OR T-O-T RESET ACTIVE
U3B
U3C
U3A
U3D
A+
C3 .01
R3 47K
T-O-T RESET
R7 100K
SWITCHED GND FROM SQUELCH GATE MODULE ACTIVATES T-O-T RESET.
LOGIC "0" INHIBITS XMTR
R12 10K
Q1
M9642
KEY INHIBIT

CEPS-29561-0

IC DATA CHART

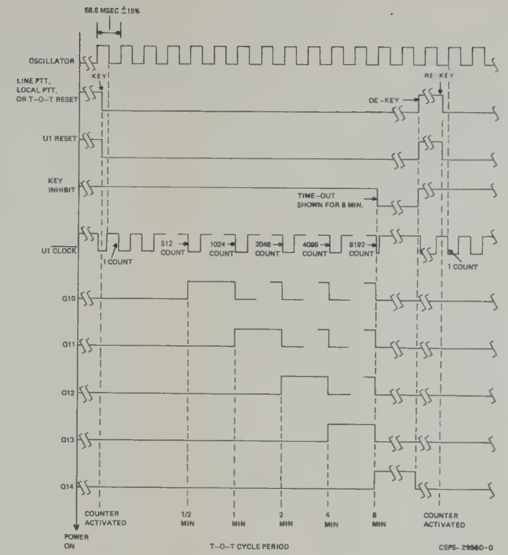
SYMBOL	TYPE	DESCRIPTION	SUPPLY (VDD) PIN NO	GROUND (VSS) PIN NO
U1	MC14020B	14-BIT BINARY COUNTER	16	8
U2	MC14011B	QUAD 2-INPUT NAND GATE	14	7
U3	MC14001B	QUAD 2-INPUT NOR GATE	14	7
U4	MC14049B	HEX INVERTER/BUFFER	1	8

JUMPER TABLE

JU1	LINE & LOCAL PTT TIME SELECT
JU2	REPEATER TIME SELECT

NOTES

1. UNLESS OTHERWISE STATED: RESISTOR VALUES ARE IN OHMS; CAPACITOR VALUES ARE IN MICROFARADS.
2. FOR SPECIAL APPLICATIONS ONLY, R8 & R9 ARE INSTALLED TO PROVIDE VARIABLE FREQUENCY (SEE CHART). R1 MUST BE REMOVED IN THESE APPLICATIONS.
3. IN SPECIAL APPLICATIONS ONLY: PERIOD CAN BE VARIED, FROM APPROXIMATELY 35 MSEC TO APPROXIMATELY 100 MSEC.
4. THIS IS A FUNCTIONAL, POSITIVE LOGIC DIAGRAM. REFER TO BASIC LOGIC CIRCUIT GUIDE, 68P81106E88.


58.6 MSEC ±15%
OSCILLATOR
KEY
LINE PTT, LOCAL PTT, OR T-O-T RESET
DE-KEY
RE KEY
U1 RESET
KEY INHIBIT
TIME-OUT SHOWN FOR 8 MIN.
U1 CLOCK
1 COUNT
512 COUNT
1024 COUNT
2048 COUNT
4096 COUNT
8192 COUNT
1 COUNT
Q10
Q11
Q12
Q13
Q14
COUNTER ACTIVATED
POWER ON
1/2 MIN
1 MIN
2 MIN
4 MIN
8 MIN
COUNTER ACTIVATED
T-O-T CYCLE PERIOD

CEPS-29560-0

VARIABLE TIMING CHART (SPECIAL APPLICATIONS ONLY)

		Q10	Q11	Q12	Q13	Q14	DISABLE
FACTORY FIXED (±15%)	58.6 MSEC OR 17.1 HZ	1/2 MIN	1 MIN	2 MIN	4 MIN	8 MIN	INFINITY
VARIABLE LIMITS	MAXIMUM 99.6 MSEC OR 10.0 HZ	51 SEC OR 0.85 MIN	102 SEC OR 1.7 MIN	204 SEC OR 3.4 MIN	408 SEC OR 6.8 MIN	816 SEC OR 13.6 MIN	INFINITY
	MINIMUM 35.2 MSEC OR 28.4 HZ	18 SEC OR 0.3 MIN	36 SEC OR 0.6 MIN	72 SEC OR 1.2 MIN	144 SEC OR 2.4 MIN	288 SEC OR 4.8 MIN	INFINITY

GENERAL FORMULA $F = (1/t)(2^{N-1})$, WHERE t IS THE DESIRED TIME-OUT TIME IN SECONDS, N IS THE CHOSEN Q OUTPUT NUMBER, AND F IS THE REQUIRED OSCILLATOR FREQUENCY IN HERTZ.

FOR EXAMPLE, TO CALCULATE THE OSCILLATOR FREQUENCY NEEDED TO PRODUCE A 3 MINUTE T-O-T PERIOD, FIRST DETERMINE FROM THE ABOVE CHART WHICH OUTPUT MUST BE USED – Q12. SECOND INSERT THE KNOWNS INTO THE GENERAL FORMULA, AND CALCULATE THE REQUIRED FREQUENCY

$$F = (1/t) \times (2^{N-1}) = [1/(3 \times 60)] \times (2^{12-1}) = (1/180) \times (2048) = 11.4 \text{ HZ}$$

FOR A 5 MINUTE T.O.T. PERIOD, $F = (1/t) \times (2^{N-1}) = [1/(5 \times 60)] \times (2^{13-1}) = 13.7$ HZ

BEPS-27258-A

GENERAL

The time-out-timer (T-O-T) module is standard in all repeater (RT) models and is an optional accessory for base station models. It limits the period of time the transmitter can be keyed. It can be set to limit transmission time from line controlled operation, and to limit the transmission time of individual repeater users. The timing period of each is independent of the other. The unit can be preset for 1/2, 1, 2, 4, or 8 minutes or unlimited continuous keying by jumper selection.

CIRCUIT DESCRIPTION

The initial condition of the time-out-timer module is: local PTT, line PTT and T-O-T reset at a high (logic "1") level, with A+ applied to the module.

The high local and line PTT inputs to U2A cause its output to be low. This low is inverted by U4A producing a high input to U2C-8. This high input, plus the high T-O-T reset input to U2C-9, forces the output at U2C-10 low. This low is inverted by U4B, producing a high at counter U1 reset input. The high reset input clears the counter by forcing and holding all of the outputs low.

Jumpers JU1 and JU2 connect two low outputs of U1 to the inputs of U4D and U4C, respectively. A local or line PTT input (base station) executes the T-O-T timing function via JU1. A T-O-T reset input (repeater PTT) executes the T-O-T timing function via JU2.

NOTE

Jumpers JU1 and JU2 must always be connected to some chosen outputs of U1 to prevent improper circuit operation.

The low outputs of U1 are inverted by U4D and U4C, producing high inputs at U3B-5 and U3A-1, respectively. These high inputs, plus the highs from the T-O-T reset input and U4A-2, cause the outputs of U3B and U3A to be low. These low inputs are applied to U3C and cause its output to be high. This high is applied to U2D, enabling it, and to U3D, resulting in a high at the key inhibit output of the module. This high output allows the station transmitter to operate if keyed.

The timing function is started by a low line PTT, a low local PTT, or a low T-O-T reset signal from the squelch gate module. A low on the local PTT or the line PTT input causes the output of U2A to be high. This high is delayed by R4, C2 and is inverted by U4A producing a low input to U2C-8. This low input, or a low T-O-T reset input to U2C-9, causes the output of U2C to be high which is inverted by U4B. The resulting low enables counter U1. The oscillator output passes through U2D to the clock input of U1. For every negative-going transition at the clock input of counter U1, the counter is advanced by one count.

Due to the period of the oscillator: 512 counts corresponds to 30 seconds (Q10 output); 1024 counts corresponds to 1 minute (Q11 output); 2048 counts corresponds to 2 minutes (Q12 output); 4096 counts corresponds to 4 minutes (Q13 output); and 8192 counts corresponds to 8 minutes (Q14 output). (See timing diagram.)

Assume that both time select jumpers are connected to the Q10 outputs of U1. The Q10 output goes high at the end of the 30 second timing period. This high is inverted by U4D and U4C, producing low inputs at U3B-5 and U3A-1, respectively. These low inputs, plus either the low from the T-O-T reset input or the low output of U4A-2, cause the output of U3A or U3B, respectively, to go high. The high output of either U3A or U3B causes the output of U3C to go low. This low is applied to U2D, which disables it and prevents any further transitions from reaching the clock input of U1.

The low U3C output is also applied to U3D, which functions as an inverter and causes Q1 to turn on. This results in a low at the key inhibit output of the module which inhibits the station transmitter.

The transmitter will remain inhibited until the switched ground start signal is removed from the module input. At that time, the module returns to its initial condition, which results in the counter being held in reset (all outputs low) and the station transmitter being uninhibited. When a start signal is again applied, another timing cycle begins.

If line and local PTT time select jumper JU1 is connected to the 30 second output, and repeater time select jumper JU2 is connected to the 2 minute output; then a start signal (switched ground) on either the line PTT or the local PTT input will inhibit the transmitter after 30 seconds, or a start signal on the T-O-T reset input will inhibit the transmitter after 2 minutes.

If either or both of the time select jumpers are connected to the DISABLE (ground) output of U1, the corresponding start signal input(s) will not inhibit the transmitter and unlimited continuous transmission is possible.

In special applications, it may be desirable to obtain a T-O-T cycle period other than those normally available. To vary the oscillator period, remove R1 and insert R8 and R9. Connect a +13.8 V dc power supply between pin 12 and ground, pin 1. Monitor the oscillator output at U4F-15, with respect to ground.

Then using the variable timing chart, choose an appropriate output and connect both time select jumpers to that output. Adjust R9 for the desired (calculated) period. An audio frequency counter or an oscilloscope may be used to monitor the oscillator output.

MAINTENANCE & TROUBLESHOOTING

This module may be serviced either while connected to the station or while connected to external test equipment as described in the Control Chassis section of this manual. The following check-out procedure is intended for out-of-station servicing but is functionally applicable to in-station servicing also.

CAUTION

This module uses CMOS integrated circuits which can be damaged by excessive static charges. Handle module by edges only.

Step 1. Remove the module from the chassis.

Step 2. Connect a 13.5 V dc power supply to the module so ground (-) is connected to pin 1 and the positive (+) terminal is connected to pin 12. Turn the power supply on.

Step 3. Connect a 5k ohm resistor between module pins 4 and 12.

Step 4. Connect time selection jumpers JU1 & JU2 to the "DISABLE" output (ground).

Step 5. Check the oscillator frequency with a counter connected between pin 15 of U4 and ground. The frequency should be 17.1 Hz ±2.5 Hz. An oscilloscope may be used in place of the audio frequency counter. The oscillator period should be 58.6 msec, ±9 msec.

Step 6. Connect a temporary jumper between module pins 5 and 1.

Step 7. Refer to the schematic and timing diagram and note the desired timing cycle for different outputs of the module. Use a stop-watch to compare the desired timing of highs and lows on a VTVM. Timing should be accurate to within ±15%.

Step 8. Move the temporary jumper to pins 6 and 1 and repeat Step 7.

Step 9. Move the temporary jumper to pins 22 and 1 and repeat Step 7.

Step 10. Connect both time selection jumpers to "1/2 MIN" output. Module pin 4 should go low after 1/2 minute (±4 sec.).

Step 11. If a defective output is not located, check connections and continuity of plating for opens and shorts.

parts list

TRN8684B CMOS Time-Out-Timer PL-6821-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed:
C1	8-82096J21	0.33 uF ± 10%, 250 V
C2	21-82372C01	0.1 uF +80-20%, 25 V
C3	21-832501	0.01 uF +60-40%, 250 V
		transistor: (see note)
Q1	48-869642	NPN; silicon
		resistor, fixed: ± 10%; 1/4 W unless otherwise stated
R1	6-124A95	82k ± 5%
R2	6-124B08	270k ± 5%
R3	6-124C89	47k
R4, 7	6-124C97	100k
R8	6-124C89	47k (used for special applications only)
R9	18-84944C07	var. 100k ± 20%, 0.1 W (used for special applications only)
R10, 11	6-124C89	47k
R12	6-124A73	10k
		integrated circuit: (see note)
U1	51-82884L42	type MC14020B 14 bit binary counter
U2	51-82884L05	type MC14011B Quad 2-input NAND gate
U3	51-82884L04	type MC14001B Quad 2-input NOR gate
U4	51-82884L02	type MC14049B HEX inverter/buffer
		non-referenced items
	29-83167C01	TERMINAL, strain relief; 2 used
	39-10184A24	CONTACT, receptacle; 2 used
	9-83011H01	RECEPTACLE, board mounting; 9 used
	39-10184A10	CONTACT, plug; 12 used
	43-865080	BUSHING, threaded; 2 used
	3-134212	SCREW, tapping; 4-40 x 5/16; 2 used
	45-83914G01	GUIDE, card; 2 used
	64-83125L01	PANEL, screened

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers

Module	Position	Ground, Line Driver Ground	A+	Ant. Sw/L. D. Disable	TOT Reset	Key Inhibit	Xctr/Spkr Level	Keyed A-	Keyed A+	PTT Control	Local PTT	Xmit Osc Gnd/Chan Elem Gnd	Xctr Lo	Delayed Keyed A+	Line PTT	Rptr PTT	Unnotched Mic Hi	Line +/Xfmr +	Line -/Xfmr -	Line Disable	"PL" Disable Cont.	"PL" Disable	R1 Discr Input	R1 Discr Out/Disc.	R1 Sq	R1 Sq Atten.	F1 Osc Gnd/F1 Chan Elem	F2 Osc Gnd/F2 Chan Elem	9.6 Volt	DC Line Disable/Loc Xmtr Defeat	R2 Mute/Page/Rptr On/R2 Mute Atten.	R1 Osc Gnd	R2 Osc Gnd	Audio A+	Audio A-	L. D. Input
Line Driver	1	1	12	9			24*											16*	21*												17					3
Station Control	2	1,24	12	2*		3	4	7*	8*	10*	5*		11	13	14	15	16*			19*	20	23*	21	22*												
DC Transfer	3	1	12							6		15		17	10*			3	4	18	2*						14*	16*	5	19	20*	21*	22*			
Time-Out Timer	4	1	12		22	4*					5				6																					
F1/F1-"PL"	5	1, 4	12						8	23		2	17	10	19		18				21*						3*		11	16						7*
Guard Tone Dec.	6	1,17	12									2	23	6	16*					7							3			13						
Squelch Gate	7	1,23	12		22*				6		13	2		7	16	18*								10			3*									
F2/Paging/S. T. Dec.	8	1,16	12							20		2												3			6	4*			7*	15*	17*			
Options	9	1	12						24	23		15													19*	18*	14*	10*								
"Wild Card"	10	1	12						19																											
Single Tone Dec./Voting	11	1	12								13			24	14						20			3					8							
Spare	12	1	12						5		8		16	6	19														10							
Jumpers			8					10									1				5					6	4				2/3	6	7			
J1 Power Supply		4*	1*																										3*					6*	5*	
J2 Rcvr		23,26	24					8	5													11	15*		7	12			25			30	29	3	4	
J3 Test Set Meter		6									5						7																			
J4 Metering		5	21								16*		14				15																			
J5 Xmtr		20	28	14				30	25			18*	17*	27*													19	21	13						26	
J6 2nd Rcvr		5,15	12					22	19													11							1			14	3		21	
TB1 Remote Control Lines																																				
TB2 High Current																																				
TB3 External		1	10	4							8		6		12	14	20				16												18			
Individual Pins		J100-4,5	J100-1,7	J100-2				J100-10				J100-3		J100-6																						

instruction manual revision smr-3618A

For Instruction Manual

68P81025E60-D

MICOR® BASE AND REPEATER STATIONS

Behind tab CHASSIS, Remote Control Chassis Section 68P81026E17-D, pages 8, 9 and 10 are superseded with these pages 8, 9 and 10.

TCN1148A/TCN1187A/TCN1190A/
TCN1223A/TCN1224A/TCN1225A
Unified Remote Control Chassis
Interconnect Chart
Motorola No. EPS-17719-D
12/28/78-UP

UPRIGHT OUTDOOR CABINET

OPTION U27 (FOR UPRIGHT STATIONS)
OPTION C36 (FOR "COMPA-STATION" BASE RADIOS)

MODEL	SUFFIX	DESCRIPTION
THN6203A		75" Cabinet
TRN6720A		Rain Hood Vent Kit (for stations over 110 W only)
TRN6721A		Vent Seal Kit (for stations under 110 W only)

FEATURES

-- Water draina
-- Thick door g
-- Vent seal for
-- Vent kit for s

CABINET INS

-- Mount on el
-- Shady or coo
-- Minimum of

INSTALLATI

-- Mount main
sheet metal s
-- Install small
-- Similarly, m
-- Mount awni
Place acorn

PERIODIC M

-- Use a paint
steel wool to
-- Wipe cleared
-- Apply a thin
minutes. Ap

-- The above p
11-82716A0
paint inside

-- The above
Algonquin

HE INDOOR CABINET FRONT AND REAR
OORS CAN BE CHANGED TO ALLOW LEFT–
AND OPENING INSTEAD OF RIGHT–HAND
PENING.

THE DOOR OPENING CHANGE MENTIONED
N NOTE 1 IS MADE, BE SURE TO RELOCATE
HE VENT COVER TO THE UNUSED OPENING

LEVATE OUTDOOR CABINETS IF DANGER
F WATER SUBMERSION EXISTS.

OORS ON OUTDOOR CABINET ARE NOT
EMOVABLE.

TATIONS OVER 110 WATTS OUTPUT USE
RN6720A VENT KIT. STATIONS BELOW
10 WATT OUTPUT USE TRN6721A VENT
EAL KIT

ESCRIPTION

PL-5107-O

ing, #8; 6 used
machine; 8-32 x 3/8";

tapping; 8-18 x 3/8;

tapping; 8-18 x 1/2;

or vent
rain shield
rain top
cover top
13.0 x 4.5"
13.0 x 7.25"
6-hole; 2 used
4-hole; 2 used

Module	Position	Ground, Line Driver Ground	A+	Ant. Sw. Enable	T.O.T. Reset	Key Inhibit	Xmtr Spkr Level	Keyed A-	Keyed A+	PTT Control	Local PTT	Xmit Osc Gnd/Chan Elem Gnd	Xmtr Lo	Delayed Keyed A+	Line PTT	Rptr PTT	Unmatched Mic Hi	Line +/Xfmr +	Line -/Xfmr -	Line Disable	"PL" Disable Cont.	"PL" Disable	R1 Discr Input	R1 Discr Out/Disc.	R1 Sq	R1 Sq Atten.	F1 Osc Gnd/F1 Chan Elem	F2 Osc Gnd/F2 Chan Elem	9.6 Volt	DC Line Disable/Loc Xmtr Defeat	R2 Mute/Page/Rptr On/R2 Mute Atten.
Line Driver		1	12	[illegible]			14*											16*	21*												17
Station Control	2	1,24	12	2*		3	4	[illegible]	8*	10*	5*		11	13	14	15	16*			17*	20	23*	21	22*							
DC Transfer	3	1	12							6		15		17	10*			3	4	18	2*						14*	16*	5	19	20*
Time-Out Timer	4	1	12		22	4*					5				6																
F1/F1-"PL"	5	1,4	12						8	23		2	17	10	19		18				21*						3*		11	16	
Guard Tone Dec.	6	1,17	12									2	23	6	16*					7							3			13	
Squelch Gate	7	1,23	12		22*				6		13	2		[illegible]	[illegible]	18*								13			3*				
F2/Paging/S.T. Dec.	8	1,16	12							20		2												3			6	4*			7*
Options	9	1	12						24	23		15													19*	18*	14*	10*			
Wild Card	10	1	12						14																						
Single Tone Dec./Voting	11	1	12								13			24	14						20			3					8		
Spare	12	1	12						5		8		16	6	19														10		
Jumpers			8					10									1				5					6	4				2/3
J1 Power Supply		4*	[illegible]																										3*		
J2 Rcvr		23,26	24					8	5													11	15*		7	12			25		
J3 Test Set Meter		6									5						7														
J4 Metering		5	21								16		14				15														
J5 Xmtr		20	28	14				30	25			18*	17*	27*													19	21	13		
J6 2nd Rcvr		5,15	12					22	19													11							1		
TB1 Remote Control Lines																															
TB2 High Current																															
TB3 External		1	10	4							8		6		12	14	20				16										
Individual Pins		J100-4,-5	J100-1,-7	J100-2				J100-10				J100-3		J100-6																	

Module	Position	R1 Osc Gnd	R2 Osc Gnd	Audio A+	Audio A-	L.D. Input	R1 Input L.D. Out	Local Spkr	Tone Control In	R1 Audio Input	R2 Audio Input	R1 Sq Cont/R1 Sq Indic	"PL" Enable	Sw 9.6 Volt	Local F1	Function Tone Hi	Decoder Bias Sw	Function Enable	Xmtr Input/Mic Hi/Repeat Audio	R3 Osc Gnd	Single Tone Reset	"F1" Indicator/Sw A+	R2 Sq Control	Sq Gate Inhibit	XMIT "PL" Inhibit	Rptr Turn-Off/R2 Mute	R2 Disc Input	"PL" Tone In	WC 1	WC 2	WC 3
Line Driver						3	6*	23*	10*	13	22	18											15								
Station Control	2												9														17				
DC Transfer	3	21*	22*										7*																		
Time-Out Timer	4																														
F1/F1-"PL"	5					7*	6						5*	9*	13	14	15	20*	22*												
Guard Tone Dec.	6								9							11*	15*														
Squelch Gate	7							24*		17		9							11*		8*	14		17		21					
F2/Paging/S.T. Dec.	8	15*	17*										5*	8	10*	11		13			9			18*	14*						
Options	9												5	3		11		13		7*						9*					
Wild Card	10															11		13											5*	8*	16*
Single Tone Dec./Voting	11																				9	16		18*					2	4	22
Spare	12															11	15	13										7*	2	4	22
Jumpers		6	7										4						1						3	2/7					
J1 Power Supply				[illegible]	5*																										
J2 Rcvr		30	29	3	4			6		14*		13*								28		10*						16*			
J3 Test Set Meter																															
J4 Metering							9	3																							
J5 Xmtr					26														24						9			29			
J6 2nd Rcvr		14	3		21						10*									16			6*				9*	20			
TB1 Remote Control Lines																															
TB2 High Current																															
TB3 External			18																							2					
Individual Pins																															

Module	Position	WC 4	Rec Defeat/Rec Gnd	Intercom PTT	Voting Tone	R4 Osc Gnd	NA	NA	ADL Output	High Current A+	High Current A-	12 W PA MTR +	12 W PA MTR -	NA	NA	NA	NA	Audio Hi	Audio Lo	Line 1 +	Line 1 -	Line 2	Line 2	Rptr "PL" Disable	Rptr A+	Remote Rptr PTT	"PL" Disable Cont	5.8 V Reg (Opt)	F3 Osc Gnd	F4 Osc Gnd	NA	Rec Unsq Indic
Line Driver			14		2															19	20	8	7									4
Station Control	2																														6	
DC Transfer	3																															
Time-Out Timer	4																															
F1/F1-"PL"	5																															
Guard Tone Dec.	6																														18	
Squelch Gate	7																							4	20*	15*						
F2/Paging/S.T. Dec.	8																															
Options	9				21	4*																					20*	22	6*	2*		
Wild Card	10	23*	15																													
Single Tone Dec./Voting	11	23	17*	19	15*																			21*								11
Spare	12	23																										24*				
Jumpers							10																				5	8				
J1 Power Supply																																
J2 Rcvr						27								17	18			2*	1*													
J3 Test Set Meter																		1	2													
J4 Metering				20*			11	22				19	10	7	17	18	8	1	12													
J5 Xmtr									7,8	1,2,3	4,5,6	16*	15*																22	23		
J6 2nd Rcvr						4										13	2															
TB1 Remote Control Lines																				1*	3*	4*	6*									
TB2 High Current									3	1*	2*																					
TB3 External																									3	5						
Individual Pins							J100-9	J100-8																								

EPS-17719-C

HOW TO READ CHART

1. This chart shows all interconnections made by the plating on both sides of the interconnect board and by wire jumpers.
2. All pin numbers in each vertical column are electrically common (interconnected by circuit board plating).
3. To trace interconnections from any starting point to all other common points proceed as follows

Step 1. Find the module position or connector in the left hand column of the chart.
Step 2. Find the desired pin number. All pins of a specific connector are listed in the line that extends to the right.
Step 3. Note the function of the desired pin. The function is listed at the top of the column in which the pin number appears. All other pins listed in the same function column are interconnected. For each entry in the function column, trace back to the left hand column to find the module or connector number. See Example.
Step 4. * equals function source
Step 5. NA Not Assigned (Plating exists between points but not used.)

EXAMPLE
Station control module (module position 2), pin 10 has a function of P-T-T Control, which is interconnected to DC transfer module position 3 (pin 6), F1/F1-PL module position 5 (pin 23), F2/PAGING/S.T. DEC. position 8 (pin 20) and OPTIONS position 9 (pin 23).

instruction manual revision smr-3618A

For Instruction Manual

68P81025E60-D

MICOR® BASE AND REPEATER STATIONS

Behind tab CHASSIS, Remote Control Chassis Section 68P81026E17-D, pages 8, 9 and 10 are superseded with these pages 8, 9 and 10.

TCN1148A/TCN1187A/TCN1190A/
TCN1223A/TCN1224A/TCN1225A
Unified Remote Control Chassis
Interconnect Chart
Motorola No. EPS-17719-D
12/28/78-UP

FEATURES

- Water drainage holes
- Thick door gaskets
- Vent seal for stations with less than 110 W output
- Vent kit for stations with greater than 110 W output

CABINET INSTALLATION

- Mount on elevated support or platform
- Shady or cool area if possible
- Minimum of eight inches for all obstructions

INSTALLATION OF TRN6720A RAIN HOOD VENT KIT

- Mount main section (largest assembly) over opening in top of cabinet using rectangular shaped gasket and 1/2-inch sheet metal screws provided.
- Install small rectangular cover inside main section using machine screws provided.
- Similarly, mount larger cover on top of entire assembly.
- Mount awning-shaped vent shield over rear door opening using "U" shaped gasket and 3/8-inch sheet metal screws. Place acorn nuts over screws to cover exposed threads.

PERIODIC MAINTENANCE

- Use a paint scraper or putty knife to remove all loose paint and paint blisters from the cabinet. Use a wire brush or steel wool to remove remaining rust from the area. The surface must be cleaned to bare metal and free of all rust.
- Wipe cleared surface with a clean cloth
- Apply a thin even coat of primer, Part No. 11S1003A42, to all exposed metal. This coat should dry to the touch in minutes. Apply an even smooth coat of paint, Part No. 11S10026A33 (haze beige).

NOTE

Be sure water drainage holes are cleared of all paint and primer.

- The above primer and paint are available from Communications Division Parts Department. Spray paint (Part No. 11-82716A05) and spray primer (Part No. ST-4330) are also available from Parts Department. However, spraying paint inside cabinet is not recommended.

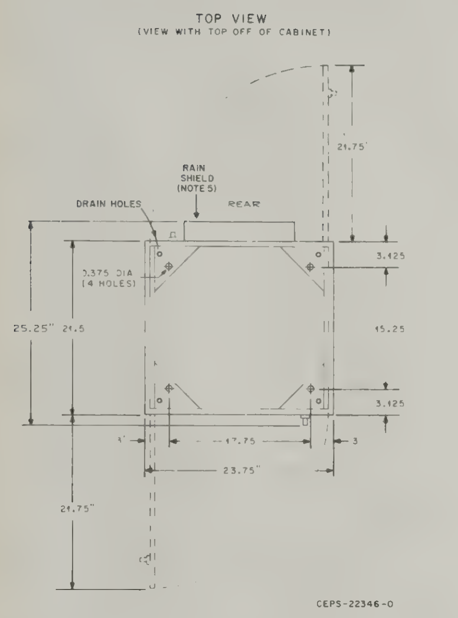
- The above kits and paint can be obtained from Motorola Communications Division Parts Department, 1313 East Algonquin Road, Schaumburg, Illinois 60196

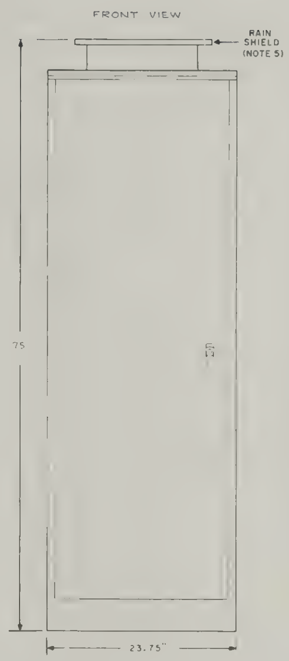
UPRIGHT OUTDOOR CABINET

OPTION U27 (FOR UPRIGHT STATIONS)
OPTION C36 (FOR "COMPA-STATION" BASE RADIOS)

[redacted]

MODEL	SUFFIX	DESCRIPTION
THN6203A		75" Cabinet
TRN6720A		Rain Hood Vent Kit (for stations over 110 W only)
TRN6721A		Vent Seal Kit (for stations under 110 W only)





NOTES

1 THE INDOOR CABINET FRONT AND REAR DOORS CAN BE CHANGED TO ALLOW LEFT HAND OPENING INSTEAD OF RIGHT HAND OPENING

2 IF THE DOOR OPENING CHANGE MENTIONED IN NOTE 1 IS MADE BE SURE TO RELOCATE THE VENT COVER TO THE UNUSED OPENING

3 ELEVATE OUTDOOR CABINETS IF DANGER OF WATER SUBMERSION EXISTS

4 DOORS ON OUTDOOR CABINET ARE NOT REMOVABLE

5 STATIONS OVER 110 WATTS OUTPUT USE TRN6720A VENT KIT STATIONS BELOW 110 WATT OUTPUT USE TRN6721A VENT SEAL KIT

PARTS LIST

THN6203A Cabinet (75-Inch) PL-5198-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
	15-82123H05	CABINET, outdoor

TRN6721A Vent Seal Kit PL-5106-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
	2-10080A03	NUT, spring; #8; 6 used
	3-132823	SCREW, tapping; #8-18 x 3/8" 4 used
	3-135014	SCREW, tapping; #8-18 x 1/2; 6 used
	26-83956H01	SHIELD (2 hole)
	26-83956H03	SHIELD (1 hole)
	32-82499L01	GASKET; 13.0 x 4.5"
	32-82499L02	GASKET; 13.0 x 7.25"

TRN6720A Rain Hood Vent Kit PL-5107-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	2-10080A03	NUT, spring, #8; 6 used
	3-9661	SCREW, machine; 8-32 x 3/8"; 8 used
	3-132823	SCREW, tapping; 8-18 x 3/8; 4 used
	3-135014	SCREW, tapping; 8-18 x 1/2; 8 used
	15-82433L01	HOOD, door vent
	15-82926H01	COVER, rain shield
	26-82929H01	SHIELD, rain top
	26-84084F01	SHIELD, cover top
	32-82499L01	GASKET; 13.0 x 4.5"
	32-82499L02	GASKET; 13.0 x 7.25"
	32-84180G01	GASKET; 6-hole; 2 used
	32-84180G02	GASKET; 4-hole; 2 used

PTION

PL-3626-O

req'd.)
g;
(4 req'd.)

PL-5104-O

oor

PL-5105-O

oor

PL-1797-A

or vent (No. 1);

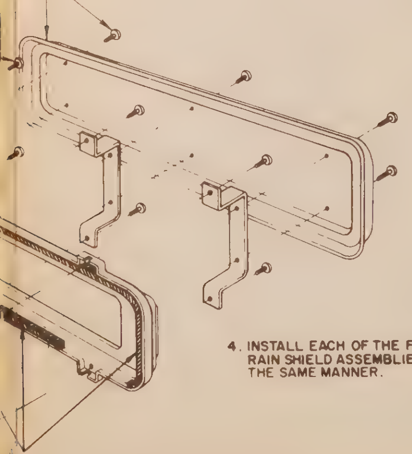
or vent (No. 2),

q'd
q'd
nt cover: 12 req'd
: 24 req'd
: 24 req'd
me: 6-32 x 11/16"

ng: 6-32 x 3/8"

32 x 1/4"; 24 req'd

ATTACH OUTER SHIELD TO BRACKETS

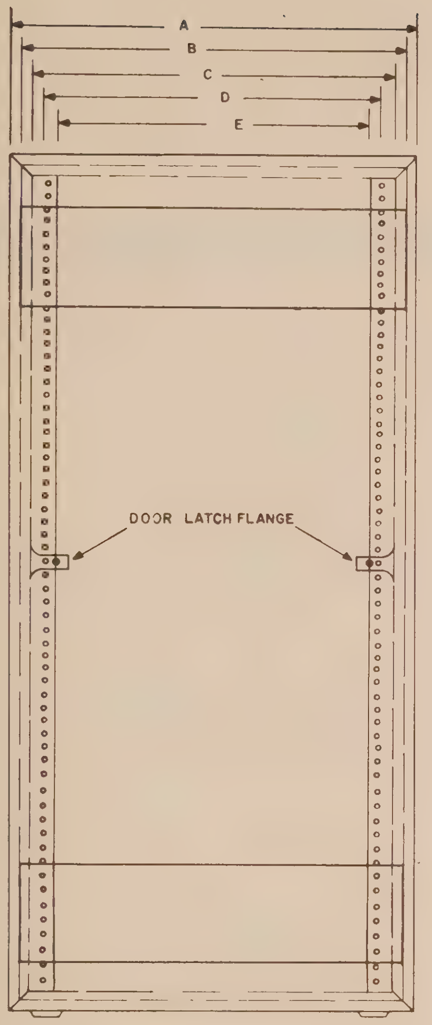


4. INSTALL EACH OF THE FOUR RAIN SHIELD ASSEMBLIES IN THE SAME MANNER.

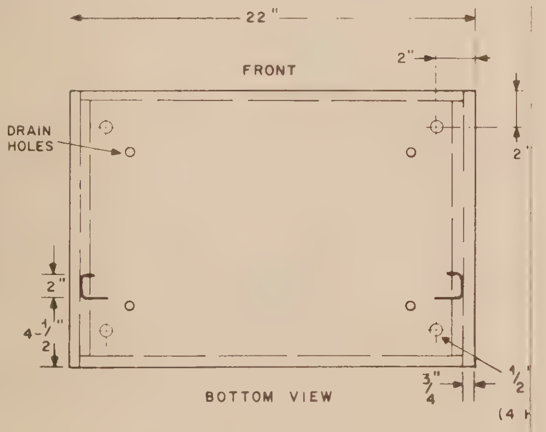
1. PEEL BACKING FROM GASKET AND PRESS ADHESIVE SIDE INTO PLACE AS SHOWN.

TATION'' OUTDOOR CABINET

C27 (FOR ''COMPA-STATION'' BASE RADIOS)



REAR VIEW



BOTTOM VIEW

MODEL	SUFFIX	DESCRIPTION
THN6143A		46'' Cabinet (vented for continuous duty
THN6303A		46'' Cabinet (sealed for intermittent duty only)
TLN4862A		Outdoor Vent Kit
TRN6448A		Cabinet Hardware Kit

FEATURES

- -- Water drainage holes
- -- Rust resistant equipment mounting rails
- -- Thick door gaskets
- -- Screw and flange type door latches
- -- Vent seal for intermittent duty stations
- -- Vent kit for continuous duty stations
- -- Sealed cabinet corner joints

CABINET INSTALLATION

- -- Mount on elevated support or platform
- -- Shady or cool are if possible
- -- Minimum of eight inches for all obstructions

CAUTION

LOOSEN *BOTH* DOOR LATCHES BEFORE OPENING CABINET OR DAMAGE TO THE DOOR MAY RESULT.

"COMPA-STATION" OUTDOOR CABINET

OPTION C27 (FOR "COMPA-STATION" BASE RADIOS)

[redacted]

MODEL	SUFFIX	DESCRIPTION
THN6143A		46" Cabinet (vented for continuous duty
THN6303A		46" Cabinet (sealed for intermittent duty only)
TLN4862A		Outdoor Vent Kit
TRN6448A		Cabinet Hardware Kit

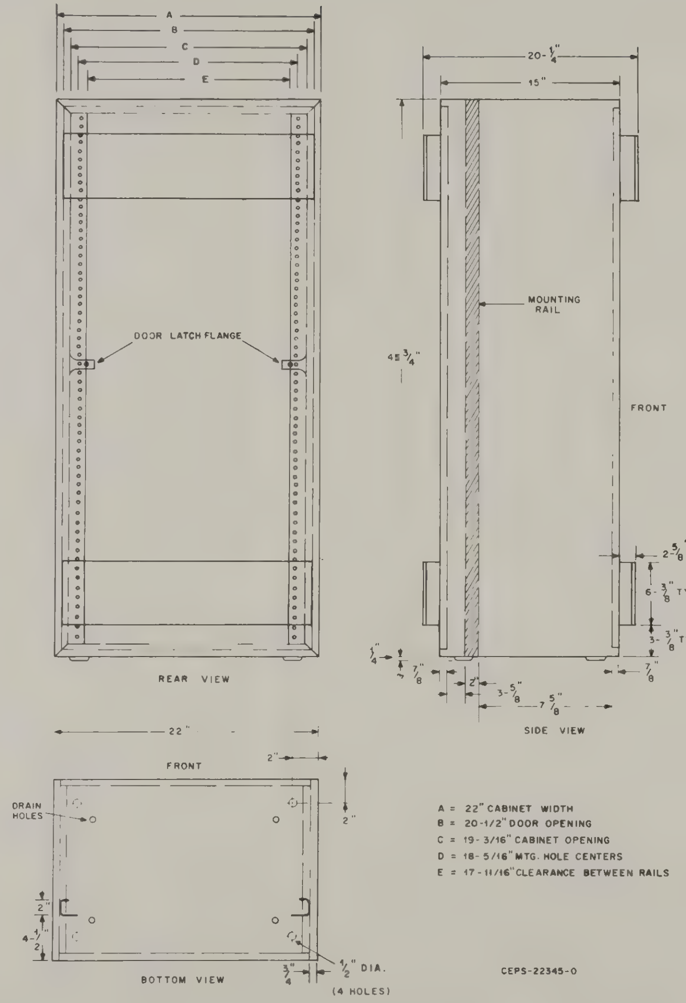
FEATURES

- -- Water drainage holes
- -- Rust resistant equipment mounting rails
- -- Thick door gaskets
- -- Screw and flange type door latches
- -- Vent seal for intermittent duty stations
- -- Vent kit for continuous duty stations
- -- Sealed cabinet corner joints

CABINET INSTALLATION

- -- Mount on elevated support or platform
- -- Shady or cool are if possible
- -- Minimum of eight inches for all obstructions

CAUTION
LOOSEN *BOTH* DOOR LATCHES BEFORE OPENING CABINET OR DAMAGE TO THE DOOR MAY RESULT.



A = 22" CABINET WIDTH
B = 20-1/2" DOOR OPENING
C = 19-3/16" CABINET OPENING
D = 18-5/16" MTG. HOLE CENTERS
E = 17-11/16" CLEARANCE BETWEEN RAILS

CEPS-22345-0

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION

PARTS LIST

TRN6448A Cabinet Hardware Kit PL-3626-O

	2-836540	SPEED NUT (4 req'd.)
	3-135499	SCREW, tapping; 1/4 - 14 x 5/8" (4 req'd.)

THN6143A Vented 46-Inch Cabinet
(For Continuous Duty Stations) PL-5104-O

	15-84144D08	CABINET, outdoor

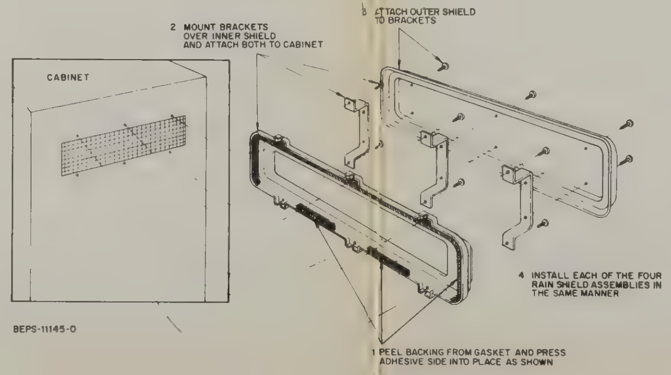
THN6303A Sealed 46-Inch Cabinet
(For Intermittent Duty Station) PL-5105-O

	15-84144D11	CABINET, outdoor

TLN4862A Outdoor Vent Kit PL-1797-A

	15-84188D01	COVER, outdoor vent (No. 1): 4 req'd
	15-84189D01	COVER, outdoor vent (No. 2), 4 req'd
	32-84452D01	GASKET: 4 req'd
	32-84452D02	GASKET: 8 req'd
	7-84187D01	BRACKET, vent cover: 12 req'd
	4-490775	FLATWASHER: 24 req'd
	4-9795	LOCKWASHER: 24 req'd
	3-138674	SCREW, machine: 6-32 x 11/16" 24 req'd
	3-138209	SCREW, tapping: 6-32 x 3/8" 24 req'd
	2-7005	NUT, hex: 6-32 x 1/4"; 24 req'd

Outdoor Vent Kit

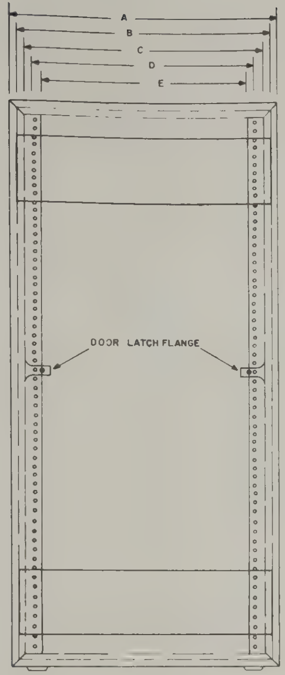


1 PEEL BACKING FROM GASKET AND PRESS ADHESIVE SIDE INTO PLACE AS SHOWN
2 MOUNT BRACKETS OVER INNER SHIELD AND ATTACH BOTH TO CABINET
3 ATTACH OUTER SHIELD TO BRACKETS
4 INSTALL EACH OF THE FOUR RAIN SHIELD ASSEMBLIES IN THE SAME MANNER

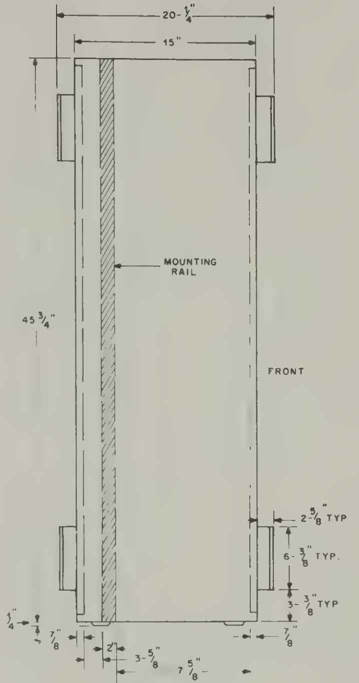
BEPS-11145-0

"COMPA-STATION" OUTDOOR CABINET

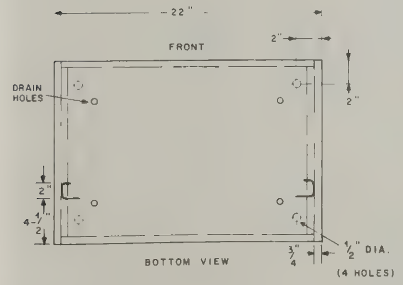
OPTION C27 (FOR "COMPA-STATION" BASE RADIOS)


A
B
C
D
E
DOOR LATCH FLANGE

REAR VIEW


20-1/4"
15"
MOUNTING RAIL
45 3/4"
FRONT
2-5/8" TYP
6-3/8" TYP.
3-3/8" TYP
1/4"
7/8"
2"
3-5/8"
7 5/8"
7/8"

SIDE VIEW


22"
FRONT
2"
2"
DRAIN HOLES
2"
4-1/2"
3/4"
1/2" DIA.
(4 HOLES)

BOTTOM VIEW

A = 22" CABINET WIDTH
B = 20-1/2" DOOR OPENING
C = 19-3/16" CABINET OPENING
D = 18-5/16" MTG. HOLE CENTERS
E = 17-11/16" CLEARANCE BETWEEN RAILS

CEPS-22345-0

PARTS LIST

TRN6448A Cabinet Hardware Kit PL-3626-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
	2-836540	SPEED NUT (4 req'd.)
	3-135499	SCREW, tapping: 1/4 - 14 x 5/8" (4 req'd.)

THN6143A Vented 46-Inch Cabinet
(For Continuous Duty Stations) PL-5104-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
	15-84144D08	CABINET, outdoor

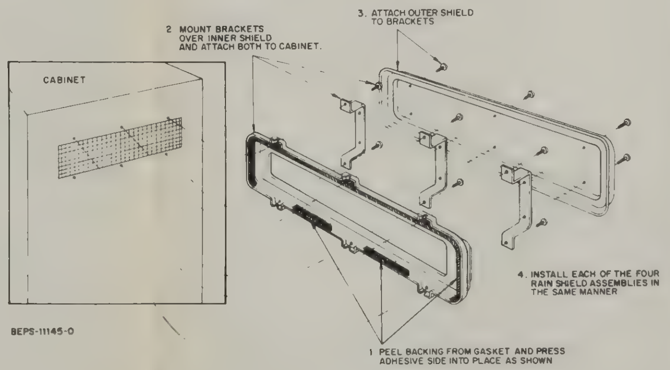
THN6303A Sealed 46-Inch Cabinet
(For Intermittent Duty Station) PL-5105-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
	15-84144D11	CABINET, outdoor

TLN4862A Outdoor Vent Kit PL-1797-A

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
	15-84188D01	COVER, outdoor vent (No. 1); 4 req'd
	15-84189D01	COVER, outdoor vent (No. 2), 4 req'd
	32-84452D01	GASKET: 4 req'd
	32-84452D02	GASKET: 8 req'd
	7-84187D01	BRACKET, vent cover: 12 req'd
	4-490775	FLATWASHER: 24 req'd
	4-9795	LOCKWASHER: 24 req'd
	3-138674	SCREW, machine: 6-32 x 11/16" 24 req'd
	3-138209	SCREW, tapping: 6-32 x 3/8" 24 req'd
	2-7005	NUT, hex: 6-32 x 1/4"; 24 req'd

Outdoor Vent Kit


CABINET
2 MOUNT BRACKETS OVER INNER SHIELD AND ATTACH BOTH TO CABINET.
3. ATTACH OUTER SHIELD TO BRACKETS
4. INSTALL EACH OF THE FOUR RAIN SHIELD ASSEMBLIES IN THE SAME MANNER
1 PEEL BACKING FROM GASKET AND PRESS ADHESIVE SIDE INTO PLACE AS SHOWN

BEPS-11145-0

MODEL	SUFFIX	DESCRIPTION
THN6143A		46" Cabinet (vented for continuous duty
THN6303A		46" Cabinet (sealed for intermittent duty only)
TLN4862A		Outdoor Vent Kit
TRN6448A		Cabinet Hardware Kit

FEATURES

-- Water drainage holes
-- Rust resistant equipment mounting rails
-- Thick door gaskets
-- Screw and flange type door latches
-- Vent seal for intermittent duty stations
-- Vent kit for continuous duty stations
-- Sealed cabinet corner joints

CABINET INSTALLATION

-- Mount on elevated support or platform
-- Shady or cool are if possible
-- Minimum of eight inches for all obstructions

CAUTION

LOOSEN *BOTH* DOOR LATCHES BEFORE OPENING CABINET OR DAMAGE TO THE DOOR MAY RESULT.

1. LOCAL OPERATION FOR TESTING & MAINTENANCE

Once power is applied and the station is properly adjusted, this base or repeater station is normally operated entirely unattended from a remote control point. However, the station may be locally operated utilizing controls on the remote control chassis. This type of operation may be necessary to accomplish station maintenance and testing.

Local operation of the station is primarily accomplished utilizing controls on the station control module located in the remote control chassis. The controls and function are listed in the table on this page.

WARNING

The transmitter can be keyed remotely. To prevent unexpected transmitter keying while servicing the station, be sure the LINE DISABLE switch is actuated (direction of arrow). Also, the TLN4662A Squelch Gate Module must be temporarily removed from the remote control chassis if the station is equipped with any of the following dc transfer modules:

TLN4637A (no suffix)
TLN4659A (no suffix)
TLN4664A (no suffix)

The following are procedures pertaining to the local operation of a remotely controlled station or repeater station.

a. Transmitter Control

To prevent the transmitter from being keyed remotely, set station control module LINE DISABLE switch in the direction of the arrow. At conclusion of local operation, insure that the LINE DISABLE switch is returned to its normal position (opposite direction of the arrow).

STATION CONTROL MODULE CONTROLS

CONTROL	POSITION	FUNCTIONS POSSIBLE
XMIT	Normal (not actuated)	Normal mode of operation.
	Actuated (hold to right)	Turns on transmitter with no modulation. Use test microphone connected to Local Mike receptacle to modulate transmitter.
"PL" DISABLE* (functional only in "Private-Line" stations)	Normal (left)	Only "PL" coded on-frequency signals accepted by receiver.
	Actuated (right)	All on-frequency signals accepted by receiver.
LINE DISABLE*	Normal (left)	Transmitter can be operated by: 1. XMIT switch 2. Local microphone 3. Remote control console
	Actuated (right)	Transmitter can not be operated by remote control console over control line.

*The DISABLE LIGHT is illuminated when the LINE DISABLE or "PL" DISABLE switch is actuated.

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b. Local Microphone

Connect a "Micor" microphone (Motorola Model TMN6054A or equivalent) to the microphone receptacle on the remote control chassis (part of J4, pins 3, 4, 5, 14, 15 & 16).

c. Local Speaker

Set the LOCAL SPKR switch to the ON position, for stations equipped with a local speaker, or connect any 8-ohm, 10-watt test speaker to J4, pins 1 and 12, on the remote control chassis. This speaker is used to monitor all received messages. A Motorola "Micor" speaker (Models TSN6016A or B, TSN6020A) plugs directly into these pins without requiring any adapter.

d. Portable Test Set

A Motorola S1056B-S1059B Series Portable Test Set with TEK-37 or TEK-37A Adapter Cable can be used as a local control facility. Connect the red "control" plug of the adapter cable to the metering receptacle (J3) on the remote control chassis. The speaker in the test set can be used for monitoring received signals and a "Motrac" microphone (Model TMN6071A) connected to the microphone receptacle on the test set can be used for originating transmissions. The XMIT button on the test set can be used to key the transmitter without voice modulation.

e. Frequency Selection

On stations with two-frequency transmitter, the frequency can be locally selected by the F1-F2 switch on the dc transfer module or F2 tone decoder module. On stations with two-frequency receivers, frequency selection is made by momentarily operating the REC F1 SELECT or REC F2 SELECT switch on the dc transfer module or F2 tone decoder module.

f. Selection of Other Modes

All other functions that can be activated by remote control can also be activated locally. Each module has test switches to activate any such functions, such as RPTR ON and RPTR OFF. Most of these switches are momentary action, which allows the station to continue operating in the selected mode until reset.

g. Received Audio

After the local speaker is turned on or connected, the station is ready to receive audio. The receiver "PL" feature, if used, can be defeated by setting the station control module "PL" DISABLE switch in the direction of the arrow. (At the conclusion of local operation, insure that the "PL" DISABLE switch is returned to its normal position.) If necessary, the receiver can be unsquelched utilizing the receiver SQUELCH control on the receiver chassis. The VOLUME control on the receiver chassis sets the audio output level of the local speaker.

h. Transmitting

NOTE

Before initiating any local transmissions, monitor the channel to insure that it is clear of other transmissions.

The transmitter is keyed locally by either activating the station control module XMIT switch or activating the push-to-talk microphone switch. Voice is transmitted using the local microphone.

i. Concluding Local Operation

At the conclusion of local operation, perform the following operations and checks to insure that the station is ready for remote operation.

(1) Reset receiver squelch level per procedures in Receiver RF and IF Section of this manual.

(2) Insure that station control module switches are positioned for normal operation (reference table).

(3) Disconnect microphone and test speaker (if used).

(4) Set all external power switches ON.

(5) Insure that station is operable from remote location.

(6) Turn local speaker OFF (if applicable).

(7) Insure that cabinet doors are locked.

(8) Insure that vents in cabinet are unobstructed.

2. MAINTENANCE TECHNIQUES

NOTE

Male connectors that mate with 50-pin flat cable connectors have been sprayed with a special compound. This compound is greasy to the touch and must not be wiped off the connector. The compound improves electrical continuity and prevents contact resistance problems.

3. TROUBLESHOOTING

Maintenance procedures for individual chassis and modules which comprise this station are contained in the applicable section of this manual. As an aid to isolating a malfunction to a specific chassis or module, a variety of techniques are appropriate.

--Most troubles in the transmitter or receiver can be quickly isolated with a Motorola portable test set, or built-in station metering if the station is so equipped. A log of normal meter readings for this station should be maintained. Each time maintenance is performed, the meter readings should be entered into the log. Variations from the previous readings can isolate a malfunction or may indicate an impending failure. If no previous meter readings are available, typical or minimum meter readings may be found in the receiver rf & i-f, exciter, power amplifier or power control board sections of this manual, as well as metering procedures.

--A check of power supply voltage under load and no-load conditions (transmit and standby) should quickly isolate any malfunction to that chassis. A comprehensive troubleshooting procedure for that chassis is provided in the power supply section of this manual.

--Isolation of a malfunction in the remote control unit requires a functional understanding of overall station operation and the interrelationship between the various modules and chassis of the station. The "Functional Description" portion of the DESCRIPTION section of this manual, along with the STATION DIAGRAM at the end of the manual, should provide this information. With a basic understanding of station operation, troubles may be isolated by analyzing the following questions:

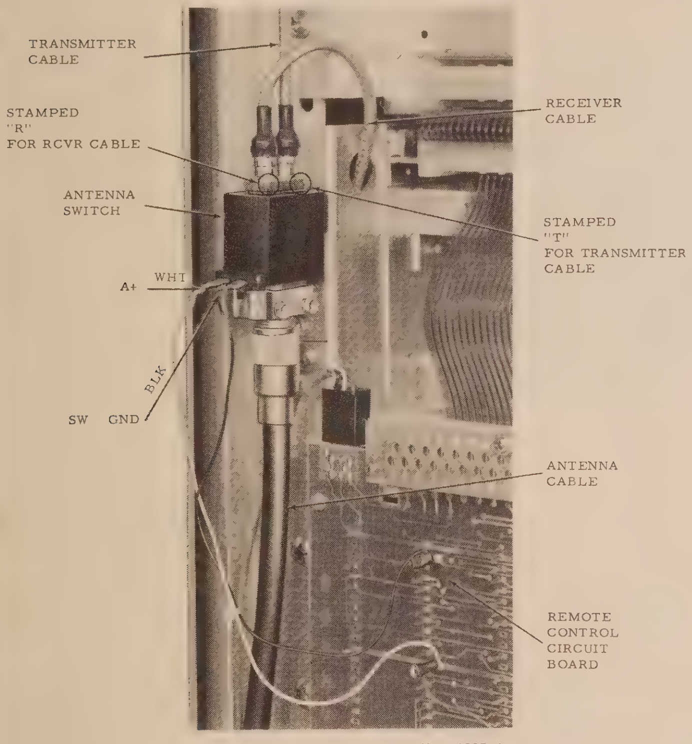
Can the station be operated locally but not remotely? If so, this eliminates many circuits as possible sources of trouble.

How many modes are inoperable? Concentrate testing on circuits that are common to the inoperable modes.

Are adjustments properly set? This includes audio level adjustments at the station and at the remote control console.

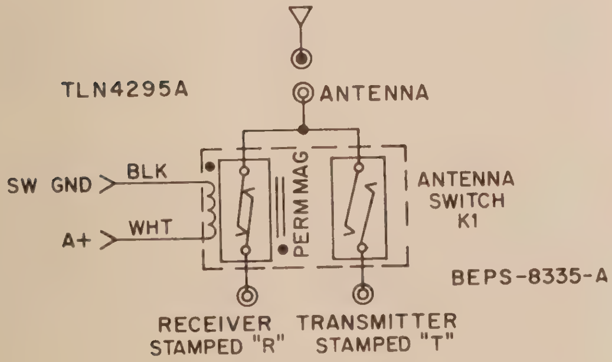
Are jumpers properly installed? The many jumpers in this equipment provides vast flexibility, but could be a source of trouble if improperly added or removed.

ANTENNA SWITCH
MODEL TLN4295A
& MISCELLANEOUS HARDWARE


TRANSMITTER CABLE
STAMPED "R" FOR RCVR CABLE
ANTENNA SWITCH
A+
WHT
BLK
SW GND
RECEIVER CABLE
STAMPED "T" FOR TRANSMITTER CABLE
ANTENNA CABLE
REMOTE CONTROL CIRCUIT BOARD

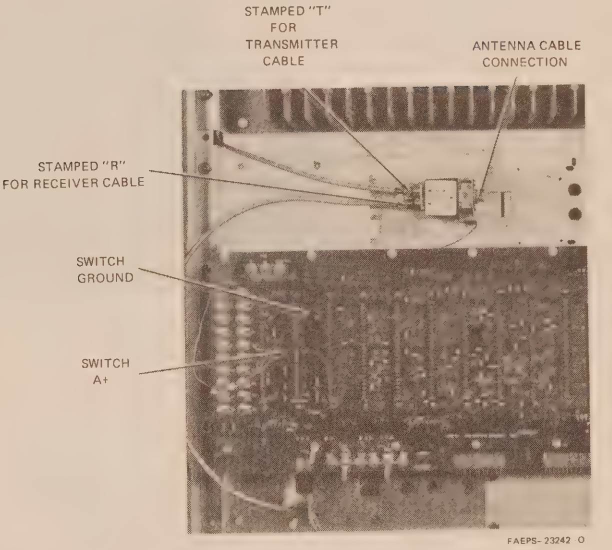
AEPS-9227-A

Antenna Switch Installation and Connection for Intermittent Duty Stations


TLN4295A
ANTENNA
SW GND
BLK
A+
WHT
PERMMAG
ANTENNA SWITCH K1
RECEIVER STAMPED "R"
TRANSMITTER STAMPED "T"

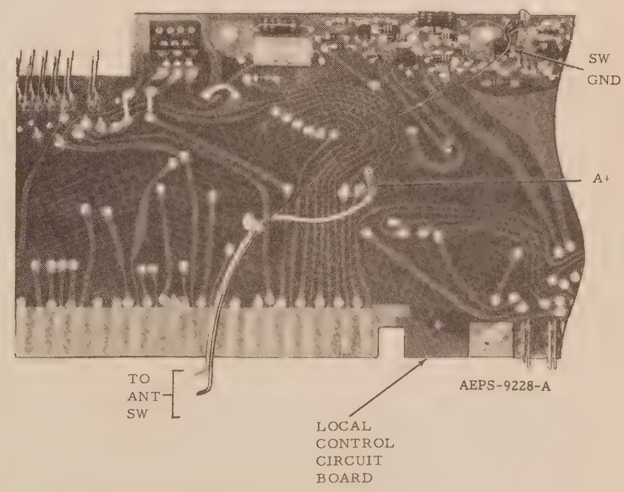
BEPS-8335-A

Antenna Switch Schematic Diagram


STAMPED "T" FOR TRANSMITTER CABLE
ANTENNA CABLE CONNECTION
STAMPED "R" FOR RECEIVER CABLE
SWITCH GROUND
SWITCH A+

FAEPS-23242 O
(N 368)

Antenna Switch Installation and Connection for Continuous Duty Stations


SW GND
A+
TO ANT SW
LOCAL CONTROL CIRCUIT BOARD

AEPS-9228-A

Antenna Switch Connection to Local Control Circuit Board

PARTS LIST SHOWN ON BACK OF THIS PAGE.

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REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

PARTS LIST

IMPORTANT

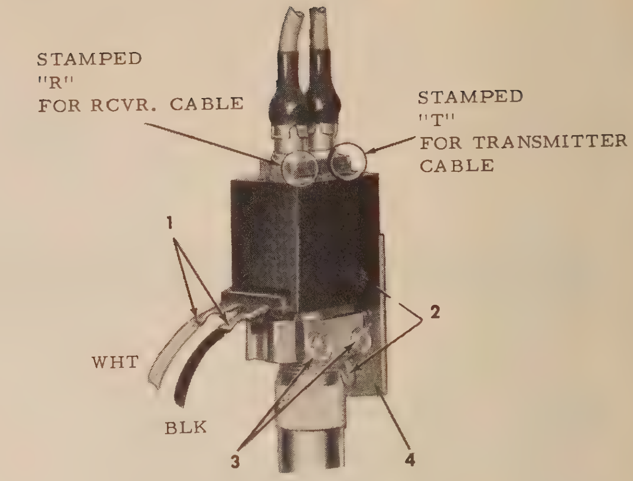
USE ONLY THE FOLLOWING MOTOROLA PART NUMBERS WHEN ORDERING REPLACEMENT PARTS

Antenna Switch PL-1731-O

K1	TLN4295A	REED SWITCH: antenna switch NOTE Field servicing of this item not recommended, must be replaced as a unit.

Mechanical Items (not part of antenna switch)

1	29-82010D01	TERMINAL, female
2	3-131965	LOCKSCREW: tapping, 8-32 x 3/8" pln hex
3	3-135841	LOCKSCREW: tapping 6-32 x 1" pln hex
4	7-84266D01	BRACKET


STAMPED
"R"
FOR RCVR. CABLE
STAMPED
"T"
FOR TRANSMITTER CABLE
1
2
WHT
BLK
3
4

AEPS-8641-A

FILTERS AND DUPLEXERS

T1480A SERIES
148-174 MHz

AEPS-8408-O

1. INTRODUCTION

These filters and duplexers are for use with "Motorola" FM two-way radio communications equipment operating in the 148-174 MHz frequency range. They utilize cavity resonators with a special internal loading construction to achieve a size much less than one-quarter wavelength and are tuned with an adjustable center conductor. The resonators use a unique temperature compensating mechanism and uniquely adjustable coupling loops. Specially designed low-profile cable connectors are used to obtain an extremely compact package.

These units may be used in the antenna circuit of a base station or repeater to eliminate or minimize receiver desensitization or intermodulation from strong signals. Similarly, they may be used to reduce transmitter noise or intermodulation products.

2. INSTALLATION

a. Bracket-Mounted Filters

(1) Carefully unpack the unit and check for concealed damage.

(2) Select a mounting location near the associated equipment or inside the equipment cabinet that will permit using the shortest cabling between the filter and the equipment.

(3) Using the mounting bracket as a template, mark the locations of the desired mounting holes.

(4) Drill the mounting holes required by the type of mounting hardware to be used.

(5) Mount the filter using the hardware supplied.

(6) Connect the filter to the transmitter or receiver. Cables external to the filter are not of a critical length.

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PERFORMANCE SPECIFICATIONS

FILTERS

MODEL NUMBER	T1481A	T1482A
INSERTION LOSS	0.6 dB	1.3 dB
MAXIMUM POWER INPUT	125 W	125 W
MINIMUM PASS-REJECT SEPARATION	1.5 MHz	±1.5 MHz
MINIMUM REJECT ATTENUATION	35 dB @ 1.5 MHz	42 dB @ 1.5 MHz
TEMPERATURE RANGE	-30°C to +60°C	-30°C to +60°C
SIZE	6" x 5" x 8-1/2"	19" x 5-1/2" x 8-1/2"
TERMINATION	N Female	N Female

DUPLEXERS

MODEL NUMBER	T1485A	T1485AF	T1487A	T1487AF
INSERTION LOSS	0.7 dB	0.9 dB	1.5 dB	1.7 dB
ISOLATION AT TRANSMIT FREQUENCY	52 dB		82 dB	
ISOLATION AT RECEIVER FREQUENCY	52 dB		82 dB	
MINIMUM TRANSMITTER RECEIVER ISOLATION	35 dB		52 dB	
MINIMUM FREQUENCY SEPARATION	3 MHz		1.5 MHz	
VSWR MAXIMUM	1.5:1		1.5:1	
MAXIMUM POWER INPUT	125 W		125 W	
TEMPERATURE RANGE	-30°C to +60°C		-30°C to +60°C	
SIZE	19" x 5-1/2" x 8-1/2"		19" x 5-1/2" x 8-1/2"	
TERMINATION	N Female		N Female	

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

EPS-8409-O

MOTOROLA

MODEL CHART

FOR

FILTERS AND DUPLEXERS

148-174 MHz

CODE:

☒ = ONE ITEM SUPPLIED.

2 = NUMBER INDICATES QUANTITY OF ITEMS SUPPLIED.

MODEL	DESCRIPTION	TLD8392A CAVITY FILTER KIT	TKN6471A CABLE KIT	TKN6472A CABLE KIT	TKN6473A CABLE KIT	TKN6474A CABLE KIT	TLN4565A MOUNTING HARDWARE KIT	TLN4566A MOUNTING HARDWARE KIT
T1481A	PASS-REJECT FILTER	X		X			X	
T1482A	DUAL-REJECT FILTER	2	X	X				X
T1485A	TWO-CAVITY PASS-REJECT DUPLEXER	2		X	X			X
T1485AF	TWO-CAVITY PASS-REJECT DUPLEXER (FACTORY-INSTALLED)	2			X	X		X
T1487A	FOUR-CAVITY PASS-REJECT DUPLEXER	4	2	X	X			X
T1487AF	FOUR-CAVITY PASS-REJECT DUPLEXER (FACTORY-INSTALLED)	4	2		X	X		X

b. Rack Panel-Mounted Units

(1) Carefully unpack the unit and check for concealed damage.

(2) The units are designed to mount on any standard 19-inch relay rack. Select position in rack for best location of unit, i.e., closest proximity to associated equipment inputs and outputs.

(3) Mount unit in place in rack with appropriate mounting hardware. The hardware supplied is intended for use with "Motorola" base stations.

(4) Connect the filter or duplexer to the transmitter and receiver.

(5) Duplexers and filters must be installed with appropriate lengths of 50-ohm coaxial cable (not supplied) to fit the individual installation.

3. THEORY OF OPERATION

Each resonant cavity, technically a re-entrant quarter-wave resonator, is a very high Q (low loss) tunable tank circuit. A special internal construction uses two different characteristic impedances for the center conductor to achieve an overall length considerably less than a quarter-wavelength. The dimensions are designed for minimum loss. The cavities are tuned to the required pass frequency by an adjustment which changes the length of the center conductor. Lower frequencies have more of the center conductor inside the cavity, higher frequencies have correspondingly less. Special bimetal washers are used for temperature compensation to minimize detuning due to ambient temperature changes.

Each resonant cavity is fitted with a specially designed pair of coupling elements (loops). These loops efficiently convert energy from the 50-ohm coaxial cable to the correct mode inside the resonant structure. When the cavity is not tuned to resonance, most of the energy is reflected. Only a small portion is able to excite the correct mode and reach the output element.

The input and output coupling loops are placed very close to each other, to take advantage of mutual coupling. A small amount of energy is always being transferred between coupling loops because of their proximity. At one frequency, the energy transferred by mutual coupling cancels the energy transferred across by the resonant mode within the cavity. Thus, at one frequency, there is a reject notch in addition to the normal selectivity of the cavity. The proximity of the loops provides inductive coupling. In addition, a precision high Q trimmer capacitor is connected across the loops. This capacitor can adjust the net coupling to be inductive or capacitive. When the net coupling is inductive, the notch occurs above the pass frequency. When the net coupling is capacitive, the notch occurs below the pass frequency.

Cavities are used on each side of a duplexer. The cavities tuned to pass the lower frequency have the coupling loops tuned to notch out the higher frequency, while the cavities tuned to pass the higher frequency have the coupling loops tuned to notch out the lower frequency. Quarter-wave coupling is used between cavities to obtain minimum pass band bandwidth and minimum insertion loss.

4. REMOVAL/REPLACEMENT OF COUPLING LOOPS

Coupling loops are factory-installed in all T1480A Series Cavity Filters and Duplexers. If it becomes necessary to change coupling loops, refer to Figures 1, 2 and 3 and use the following procedure.

a. Removal Procedure

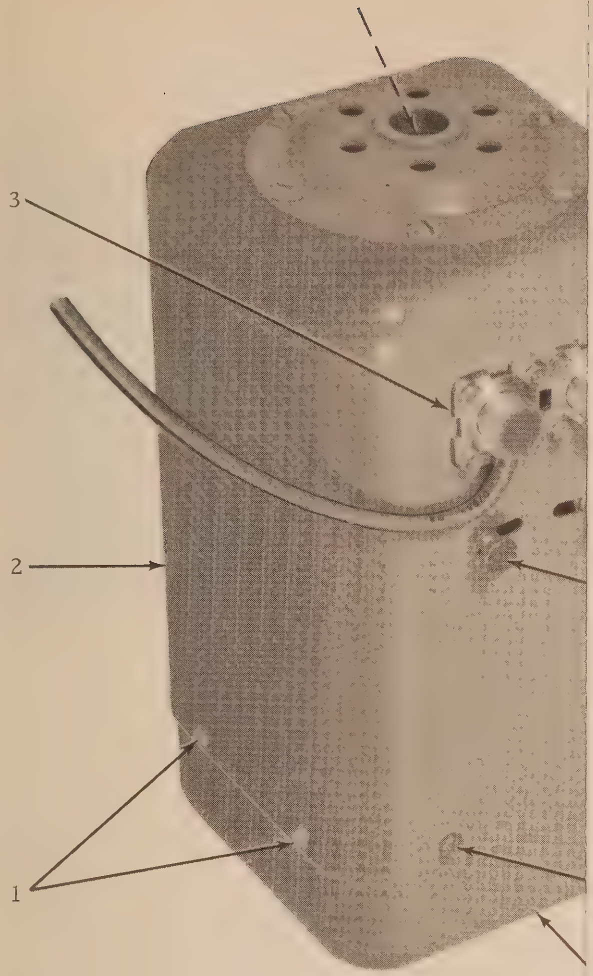
The cable shields are soldered to the connector portion of the loops. These shields must first be unsoldered before the loops can be removed. The shields cannot be unsoldered while the connectors are attached to the cavity body because the cavity body acts as a heat sink.

(1) Remove the eight screws securing the connectors to the cavity body.

(2) The two coupling loops are internally connected and must be removed together. Using a 150-watt soldering iron, first unsolder and remove the connector covers from the two connectors.

(3) Grasp the center conductor of the cable (at the point where it enters the center pin of the connector) with long nose pliers. Melt the solder around the cable shield and pull the cable off the connector. Do the same for the other connector.

(4) Remove the two knurled adjusting knobs taking care not to lose the washers. Now the loops are completely free and can be removed from the can.



AEPS-8411-O

Figure 1.
Cavity Filter P
Location Deta

NOTE:

THE OVERALL DIMENSIONS AND THE S
CABLES ARE CRITICAL, AND IT IS THE
COMMENDED THAT AN ENTIRE CABLE
USING THE CORRECT TKN NUMBER (TK
TKN6473A OR TKN6474A). THE CONNEC
(CODE NO. 6) ARE INCLUDED IN THE C

PARTS LIST

TLD8392A Cavity Filter PL-1677-O

CODE	MOTOROLA PART NO.	DESCRIPTION
1	3-3375	SCREW, tapping: 6-20 x 5/16" plain hex head (4 req'd)
2	1-84312D01	CAVITY ASSEMBLY
3	1-80723B90	LOOP ASSEMBLY, coupling
4	47-84313D01	TUNING SHAFT
5	3-134168	SCREW, tapping: 4-32 x 1/4" Phillips hex head; internal lockwasher (8 req'd)
7	3-82245E04	SCREW, knurled head (2 req'd)
7	4-9746	LOCKWASHER: No. 8 med. split (2 req'd)
7	4-82418B01	WASHER, nylon (2 req'd)
9	15-84993C02	COVER, housing
10	4-84994C01	WASHER, temperature compensating ("LE" stamped on concave side)
11	4-84994C02	WASHER, temperature compensating ("LE" stamped on convex side)
12	1-84985C01	LOCKING NUT ASSEMBLY
13	3-7110	SCREW, set: 8-32 x 3/16" allen head
14	1-84314D01	TUNING CAN ASSEMBLY
15	42-824977	RING, truarc

TLN4565A Mounting Hardware Kit (1-Cavity) PL-1678-O

CODE	MOTOROLA PART NO.	DESCRIPTION
	7-84395D01	BRACKET, cavity mtg
8	3-3398	SCREW, tapping: 6-20 x 3/8" plain hex head (4 req'd)
	3-1209	SCREW, machine: 10-32 x 1/2" slotted binder head (4 req'd)
	3-7658	LOCKWASHER: No. 10 internal (4 req'd)
	2-7048	NUT, machine: 10-32 x 5/16" hex (4 req'd)
	3-136716	SCREW, wood: No. 10 x 1-1/2" slotted round head (4 req'd)
	33-84002B01	NAMEPLATE, cavity
	66-82846D01	TOOL, tuning

TLN4566A Mounting Hardware Kit (2 or 4-Cavities) PL-1679-O

CODE	MOTOROLA PART NO.	DESCRIPTION
	64-84003D01	PANEL, cavity mtg (top)
	64-84004D01	PANEL, cavity mtg (bottom)
8	3-3398	SCREW, tapping: 6-20 x 3/8" plain hex head (16 req'd)
	3-128109	SCREW: 6-32 x 1/4" slotted round head; external lockwasher (6 req'd)
	3-135038	SCREW, tapping: No. 14 x 3/4" Phillips pan head (4 req'd)
	2-82360B07	NUT, sheet spring: ("clip-on"); type "U" (4 req'd)
	4-812732	WASHER, cushion (4 req'd)
	33-84333B01	NAMEPLATE
	66-82846D01	TOOL, tuning

b. Rack Panel-Mounted Units

(1) Carefully unpack the unit and check for concealed damage.

(2) The units are designed to mount on any standard 19-inch relay rack. Select position in rack for best location of unit, i.e., closest proximity to associated equipment inputs and outputs.

(3) Mount unit in place in rack with appropriate mounting hardware. The hardware supplied is intended for use with "Motorola" base stations.

(4) Connect the filter or duplexer to the transmitter and receiver.

(5) Duplexers and filters must be installed with appropriate lengths of 50-ohm coaxial cable (not supplied) to fit the individual installation.

3. THEORY OF OPERATION

Each resonant cavity, technically a re-entrant quarter-wave resonator, is a very high Q (low loss) tunable tank circuit. A special internal construction uses two different characteristic impedances for the center conductor to achieve an overall length considerably less than a quarter-wavelength. The dimensions are designed for minimum loss. The cavities are tuned to the required pass frequency by an adjustment which changes the length of the center conductor. Lower frequencies have more of the center conductor inside the cavity, higher frequencies have correspondingly less. Special bimetal washers are used for temperature compensation to minimize detuning due to ambient temperature changes.

Each resonant cavity is fitted with a specially designed pair of coupling elements (loops). These loops efficiently convert energy from the 50-ohm coaxial cable to the correct mode inside the resonant structure. When the cavity is not tuned to resonance, most of the energy is reflected. Only a small portion is able to excite the correct mode and reach the output element.

The input and output coupling loops are placed very close to each other, to take advantage of mutual coupling. A small amount of energy is always being transferred between coupling loops because of their proximity. At one frequency, the energy transferred by mutual coupling cancels the energy transferred across by the resonant mode within the cavity. Thus, at one frequency, there is a reject notch in addition to the normal selectivity of the cavity. The proximity of the loops provides inductive coupling. In addition, a precision high Q trimmer capacitor is connected across the loops. This capacitor can adjust the net coupling to be inductive or capacitive. When the net coupling is inductive, the notch occurs above the pass frequency. When the net coupling is capacitive, the notch occurs below the pass frequency.

Cavities are used on each side of a duplexer. The cavities tuned to pass the lower frequency have the coupling loops tuned to notch out the higher frequency, while the cavities tuned to pass the higher frequency have the coupling loops tuned to notch out the lower frequency. Quarter-wave coupling is used between cavities to obtain minimum pass band bandwidth and minimum insertion loss.

4. REMOVAL/REPLACEMENT OF COUPLING LOOPS

Coupling loops are factory-installed in all T1480A Series Cavity Filters and Duplexers. If it becomes necessary to change coupling loops, refer to Figures 1, 2 and 3 and use the following procedure.

a. Removal Procedure

The cable shields are soldered to the connector portion of the loops. These shields must first be unsoldered before the loops can be removed. The shields cannot be unsoldered while the connectors are attached to the cavity body because the cavity body acts as a heat sink.

(1) Remove the eight screws securing the connectors to the cavity body.

(2) The two coupling loops are internally connected and must be removed together. Using a 150-watt soldering iron, first unsolder and remove the connector covers from the two connectors.

(3) Grasp the center conductor of the cable (at the point where it enters the center pin of the connector) with long nose pliers. Melt the solder around the cable shield and pull the cable off the connector. Do the same for the other connector.

(4) Remove the two knurled adjusting knobs taking care not to lose the washers. Now the loops are completely free and can be removed from the can.

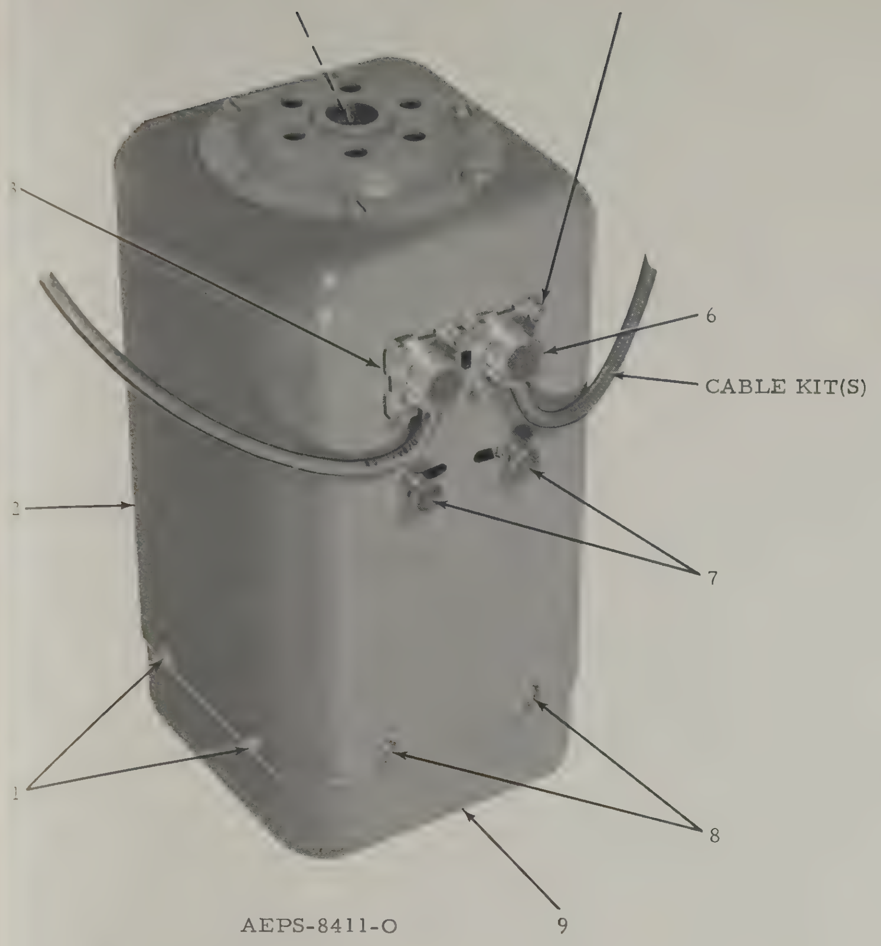


Figure 1.
Cavity Filter Parts
Location Detail

NOTE:

THE OVERALL DIMENSIONS AND THE STRIPPING OF CABLES ARE CRITICAL, AND IT IS THEREFORE RECOMMENDED THAT AN ENTIRE CABLE KIT BE ORDERED USING THE CORRECT TKN NUMBER (TKN6471A, TKN6472A, TKN6473A OR TKN6474A). THE CONNECTOR COVERS (CODE NO. 6) ARE INCLUDED IN THE CABLE KIT.

EPS-8086-O

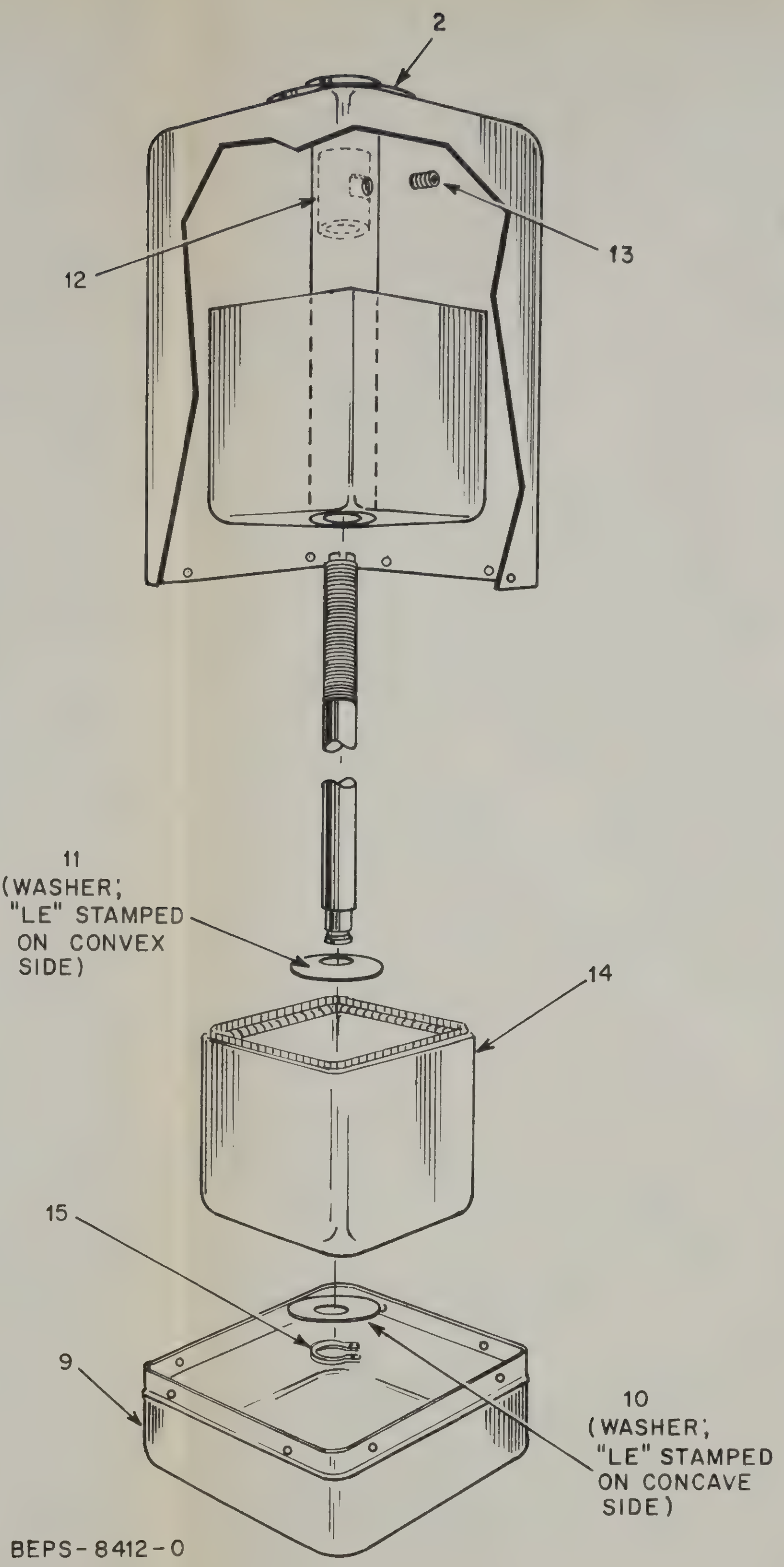


Figure 2.
Cavity Internal Construction
and Parts Location Detail

PARTS LIST

TLD8392A Cavity Filter PL-1677-O

CODE	MOTOROLA PART NO.	DESCRIPTION
1	3-3375	SCREW, tapping: 6-20 x 5/16" plain hex head (4 req'd)
2	1-84312D01	CAVITY ASSEMBLY
3	1-80723B90	LOOP ASSEMBLY, coupling
4	47-84313D01	TUNING SHAFT
5	3-134168	SCREW, tapping: 4-32 x 1/4" Phillips hex head; internal lockwasher (8 req'd)
7	3-82245E04	SCREW, knurled head (2 req'd)
7	4-9746	LOCKWASHER: No. 8 med. split (2 req'd)
7	4-82418B01	WASHER, nylon (2 req'd)
9	15-84993C02	COVER, housing
10	4-84994C01	WASHER, temperature compensating ("LE" stamped on concave side)
11	4-84994C02	WASHER, temperature compensating ("LE" stamped on convex side)
12	1-84985C01	LOCKING NUT ASSEMBLY
13	3-7110	SCREW, set: 8-32 x 3/16" allen head
14	1-84314D01	TUNING CAN ASSEMBLY
15	42-824977	RING, truarc

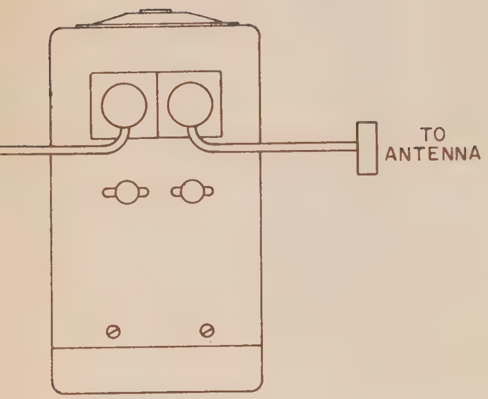
TLN4565A Mounting Hardware Kit (1-Cavity) PL-1678-O

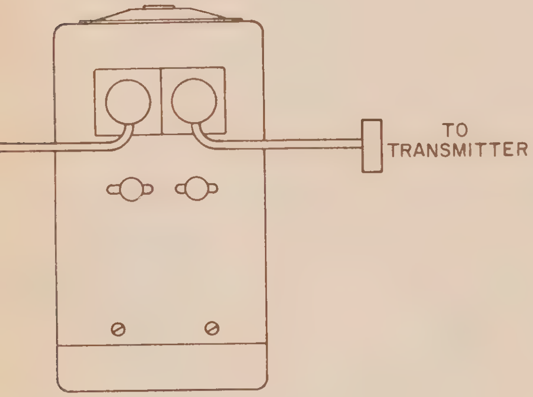
CODE	MOTOROLA PART NO.	DESCRIPTION
	7-84395D01	BRACKET, cavity mtg
8	3-3398	SCREW, tapping: 6-20 x 3/8" plain hex head (4 req'd)
	3-1209	SCREW, machine: 10-32 x 1/2" slotted binder head (4 req'd)
	3-7658	LOCKWASHER: No. 10 internal (4 req'd)
	2-7048	NUT, machine: 10-32 x 5/16" hex (4 req'd)
	3-136716	SCREW, wood: No. 10 x 1-1/2" slotted round head (4 req'd)
	33-84002B01	NAMEPLATE, cavity
	66-82846D01	TOOL, tuning

TLN4566A Mounting Hardware Kit (2 or 4-Cavities) PL-1679-O

CODE	MOTOROLA PART NO.	DESCRIPTION
	64-84003D01	PANEL, cavity mtg (top)
	64-84004D01	PANEL, cavity mtg (bottom)
8	3-3398	SCREW, tapping: 6-20 x 3/8" plain hex head (16 req'd)
	3-128109	SCREW: 6-32 x 1/4" slotted round head; external lockwasher (6 req'd)
	3-135038	SCREW, tapping: No. 14 x 3/4" Phillips pan head (4 req'd)
	2-82360B07	NUT, sheet spring: ("clip-on"); type "U" (4 req'd)
	4-812732	WASHER, cushion (4 req'd)
	33-84333B01	NAMEPLATE
	66-82846D01	TOOL, tuning

Cavity Filter
Parts Location Detail and Parts List
Motorola No. PEPS-8095-O
3/10/72-UP




TO
TRANSMITTER

OR

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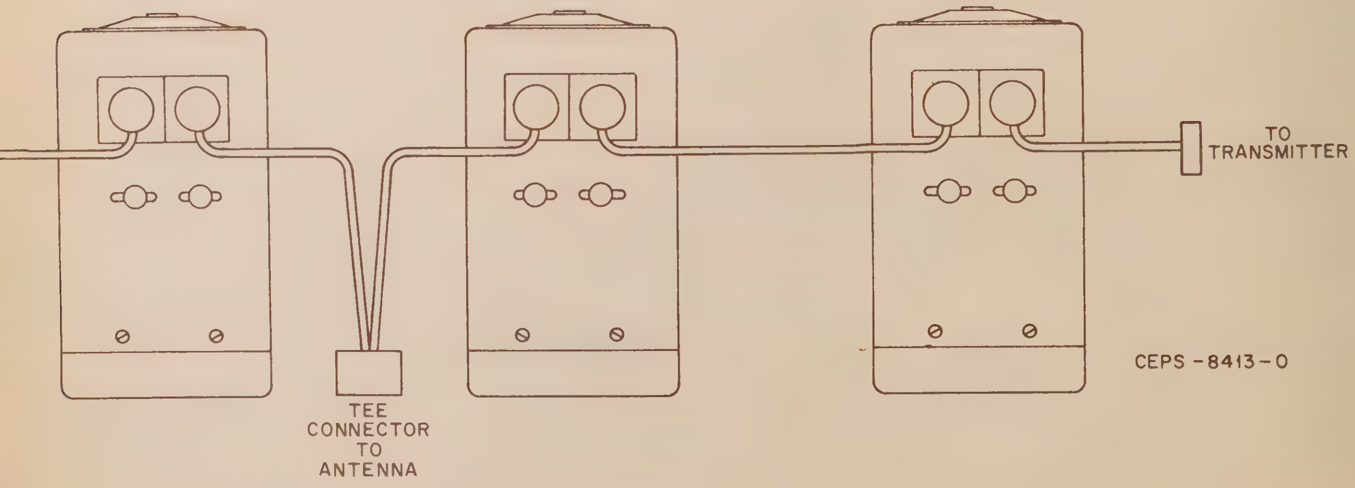

TO
TRANSMITTER
TEE
CONNECTOR
TO
ANTENNA

CEPS-8413-0

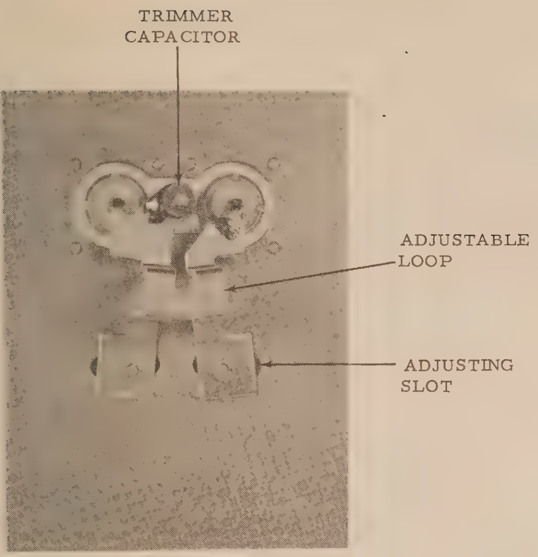


Figure 3.
Coupling Loop (Interior View)

(5) Maneuver both loops to the left so that the trimmer capacitor can fit through the left side of the hole and then remove the two loops together.

b. Replacement Procedure

(1) Insert the loop assembly into the mounting holes and maneuver both loops to the left so that the trimmer capacitor will fit through the left side of the hole.

(2) Position the loops so that the tapped holes in the end of the loops are visible through the adjusting slots.

(3) Insert the knurled adjusting screw, along with the nylon and lock washers, into the tapped hole.

(4) Attach the connectors to the can using the eight self-tapping screws making certain that the connector cable slot is facing in the proper direction to insert the cable.

(5) Insert the cable into the connector cable slot while pressing the center conductor into the center pin of the connector.

(6) Place the connector cover over the connector and solder the cable shield and connector cover to the connector.

5. RECOMMENDED TUNING PROCEDURE

All filters and duplexers are tuned to the customer-specified frequencies prior to shipment from the factor. If system performance indicates that the duplexer is detuned, one of the following procedures may be used. Do not attempt to retune unless the following procedures have been read and it is certain that performance does not meet specifications.

The following tuning procedures assume that the entire duplexer is to be retuned. If it is desired to perform a minor "touch-up", refer to paragraph e. of this tuning procedure. When left and right are used in the following procedures, this shall mean facing the tuning shaft end and with the connectors facing up.

a. Method 1 (Models T1485A, AF and T1487A, AF)

(1) Recommended Test Equipment

(a) "Motorola Model R1201 Series Signal Generator.

(b) Tunable receiver or two "Motorola" receivers, one tuned to each of the frequencies to be duplexed.

(2) Tuning Procedure

(a) Move sliding screws as far apart as possible on each cavity and then tighten the screws.

(b) Turn trimmer capacitors fully counterclockwise.

(c) Tune the signal generator and the receiver to the duplex receive frequency.

(d) Connect the signal generator to the antenna port and the receiver to the right-hand port.

(e) Tune the right-hand cavity(s) for minimum insertion loss by adjusting the tuning rod screw.

(f) Tune the signal generator and the receiver to the duplex transmit frequency.

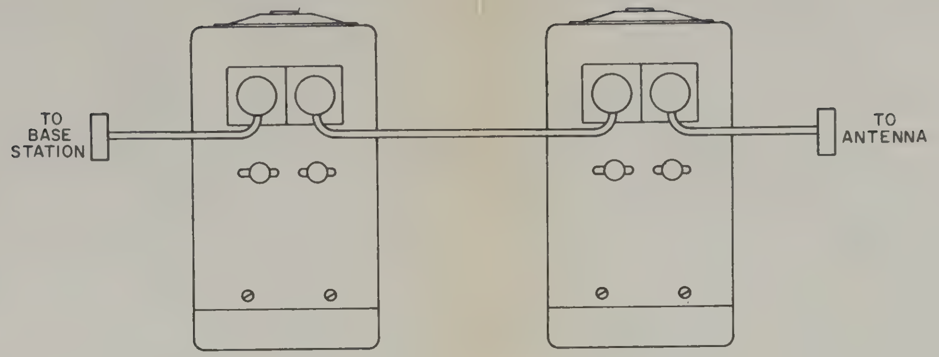
(g) Connect the receiver to the left-hand port.

(h) Tune the left-hand cavity(s) for minimum insertion loss by adjusting the tuning rod screw.

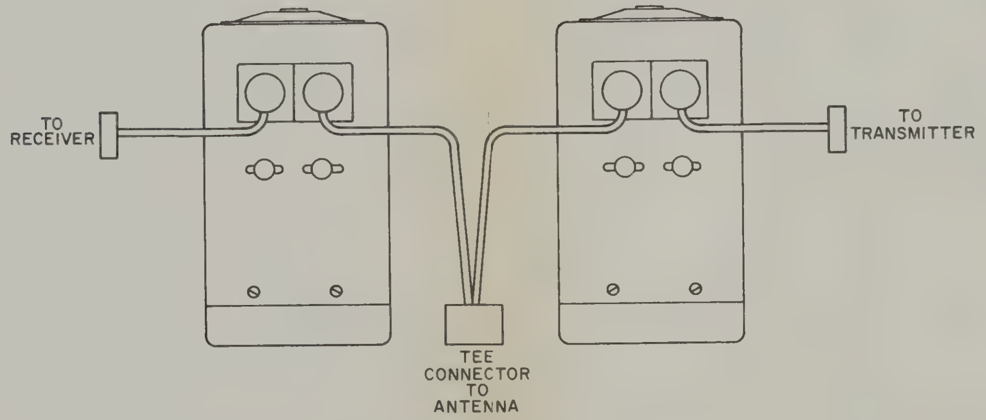
(i) Connect the receiver to the right-hand port.

(j) Tune the right-hand cavity(s) for maximum attenuation by using procedure 5.f., "Tuning the Notch".

MODEL T1482A


TO
BASE
STATION
TO
ANTENNA

MODEL T1485A


TO
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TEE
CONNECTOR
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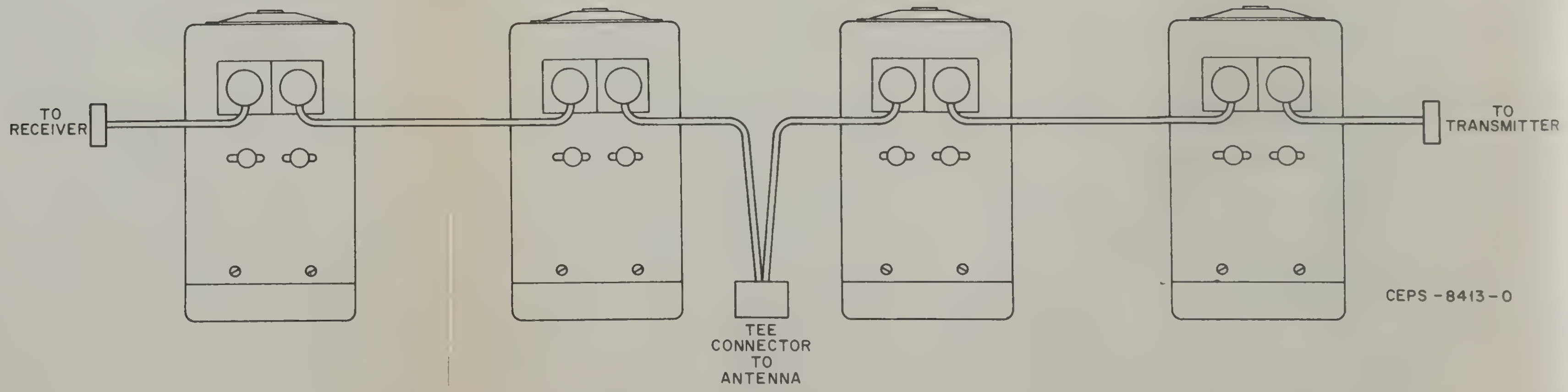
ANTENNA

MODEL T1487A


TO
RECEIVER
TO
TRANSMITTER
TEE
CONNECTOR
TO
ANTENNA
CEPS-8413-0

Duplex Cabling Detail
Motorola No. CEPS-8413-O
3/10/72-UP

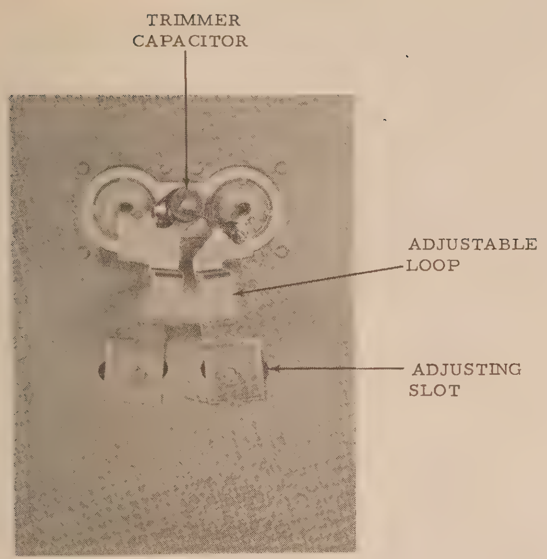


Figure 3.
Coupling Loop (Interior View)

(5) Maneuver both loops to the left so that the trimmer capacitor can fit through the left side of the hole and then remove the two loops together.

b. Replacement Procedure

(1) Insert the loop assembly into the mounting holes and maneuver both loops to the left so that the trimmer capacitor will fit through the left side of the hole.

(2) Position the loops so that the tapped holes in the end of the loops are visible through the adjusting slots.

(3) Insert the knurled adjusting screw, along with the nylon and lock washers, into the tapped hole.

(4) Attach the connectors to the can using the eight self-tapping screws making certain that the connector cable slot is facing in the proper direction to insert the cable.

(5) Insert the cable into the connector cable slot while pressing the center conductor into the center pin of the connector.

(6) Place the connector cover over the connector and solder the cable shield and connector cover to the connector.

5. RECOMMENDED TUNING PROCEDURE

All filters and duplexers are tuned to the customer-specified frequencies prior to shipment from the factor. If system performance indicates that the duplexer is detuned, one of the following procedures may be used. Do not attempt to retune unless the following procedures have been read and it is certain that performance does not meet specifications.

The following tuning procedures assume that the entire duplexer is to be retuned. If it is desired to perform a minor "touch-up", refer to paragraph e. of this tuning procedure. When left and right are used in the following procedures, this shall mean facing the tuning shaft end and with the connectors facing up.

a. Method 1 (Models T1485A, AF and T1487A, AF)

(1) Recommended Test Equipment

(a) "Motorola Model R1201 Series Signal Generator.

(b) Tunable receiver or two "Motorola" receivers, one tuned to each of the frequencies to be duplexed.

(2) Tuning Procedure

(a) Move sliding screws as far apart as possible on each cavity and then tighten the screws.

(b) Turn trimmer capacitors fully counterclockwise.

(c) Tune the signal generator and the receiver to the duplex receive frequency.

(d) Connect the signal generator to the antenna port and the receiver to the right-hand port.

(e) Tune the right-hand cavity(s) for minimum insertion loss by adjusting the tuning rod screw.

(f) Tune the signal generator and the receiver to the duplex transmit frequency.

(g) Connect the receiver to the left-hand port.

(h) Tune the left-hand cavity(s) for minimum insertion loss by adjusting the tuning rod screw.

(i) Connect the receiver to the right-hand port.

(j) Tune the right-hand cavity(s) for maximum attenuation by using procedure 5.f., "Tuning the Notch".

(k) Tune the signal generator and the receiver to the duplex receive frequency.

(l) Connect the receiver to the left-hand port.

(m) Tune the left-hand cavity(s) for maximum attenuation by using procedure 5.f.

(n) Repeat steps (c) through (m), but only tune the trimmer capacitors when tuning the notches.

b. Method 2 (Models T1485A, AF and T1487A, AF)

(1) Recommended Test Equipment

(a) Mixer circuit constructed as shown in Figure 4.

(b) "Motorola" R1201 Series Signal Generator.

(c) IF output from R1201 Series Signal Generator equal to the duplex frequency separation or a "Motorola" S1056B Portable Test Set with a crystal frequency equal to the duplex frequency separation.

(d) "Motorola" S1350A Wattmeter.

(e) "Motorola" T1013A RF Load Resistor.

(f) Isolated Tee connector (construct this by removing the Tee port center pin of a UHF Tee connector). This provides 30 to 40 dB of isolation between the shunt path and the direct path through the Tee to protect the receiver when the transmitter is keyed.

(g) Transmitter and receiver from the station to be duplexed.

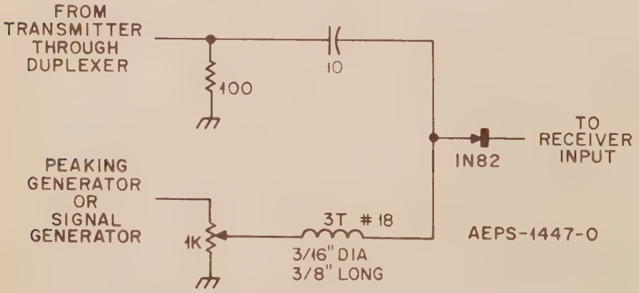

FROM TRANSMITTER THROUGH DUPLEXER
10
100
TO RECEIVER INPUT
IN82
PEAKING GENERATOR OR SIGNAL GENERATOR
1K
3T #18
3/16" DIA
3/8" LONG
AEPS-1447-0

Figure 4.
Mixer Circuit

(2) Operation of the Mixer Circuit

Alignment of the duplexers can be simplified by using the mixer circuit shown in Figure 4. The mixer receives inputs from the transmitter and a low frequency source. The outputs from the mixer are frequencies above and below the transmitter frequency at separations equal to the output of the low frequency generator.

The receiver will respond to one of the mixer products and thus can be used indirectly to detect the transmitter frequency.

(3) Tuning Procedure

(a) Move sliding screws as far apart as possible on each cavity and then tighten the screws.

(b) Turn trimmer capacitors fully counterclockwise.

(c) Connect the equipment as shown in Figure 5.

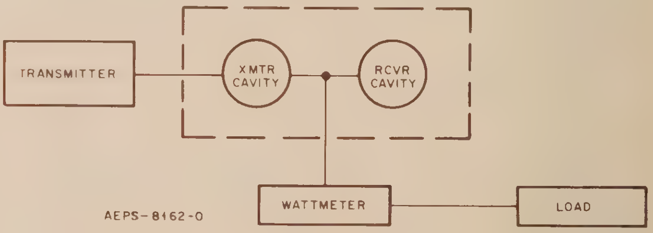

TRANSMITTER
XMTR CAVITY
RCVR CAVITY
WATTMETER
LOAD
AEPS-8162-0

Figure 5.
Method 2 Transmitter Branch
Pass Test Set-Up

(d) Tune the left-hand cavity(s) for a maximum power reading on the wattmeter by adjusting the tuning rod screw.

(e) Connect the equipment as shown in Figure 6.

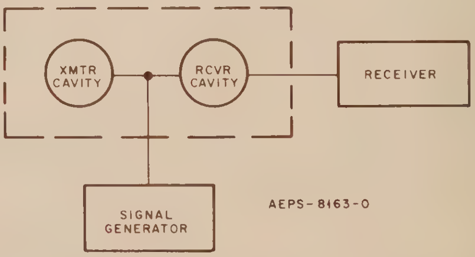

XMTR CAVITY
RCVR CAVITY
RECEIVER
SIGNAL GENERATOR
AEPS-8163-0

Figure 6.
Method 2 Receiver Branch
Pass Test Set-Up

(f) Tune the signal generator to the receive frequency.

(g) Tune the right-hand cavity(s) for a minimum insertion loss (maximum signal at the receiver) by adjusting the tuning rod screw.

(h) Connect the equipment as shown in Figure 7.

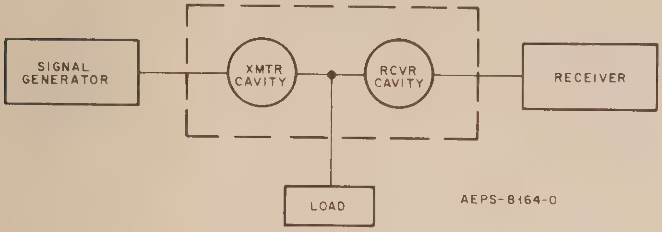

SIGNAL GENERATOR
XMTR CAVITY
RCVR CAVITY
RECEIVER
LOAD
AEPS-8164-0

Figure 7.
Method 2 Transmitter Branch Reject Test Set-Up

(i) Tune the left-hand cavity(s) for maximum attenuation by using procedure 5.f., "Tuning the Notch".

(j) Connect the equipment as shown in Figure 8.

(k) Set the local oscillator source to the exact duplex frequency separation.

(l) Tune the right-hand cavity(s) for maximum attenuation by using procedure 5.f.

(m) Repeat steps (c) through (l) but only tune the trimmer capacitors when tuning the notches.

(4) Connect the duplexer to the transmitter, receiver and antenna with 50-ohm coaxial cable. Adjust the transmitter final amplifier for rated power into the duplexer.

c. Model T1481A

This model may be tuned by using only steps (1) and steps (2)(a) through (e) and (j) and (k) of Method 1.

d. Model T1482A

(1) Recommended Test Equipment

(a) "Motorola" R1201 Series Signal Generator.

(b) Tunable receiver.

(2) Tuning Procedure

(a) Move sliding screws as far apart as possible on each cavity and then tighten the screws.

(b) Turn the trimmer capacitors fully counterclockwise.

(c) Tune the signal generator and the receiver to the pass frequency.

(d) Connect the equipment as shown in Figure 9.

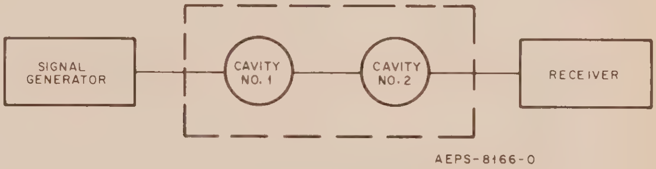

SIGNAL GENERATOR
CAVITY NO. 1
CAVITY NO. 2
RECEIVER
AEPS-8166-0

Figure 9.
Model T1482A Test Set-Up

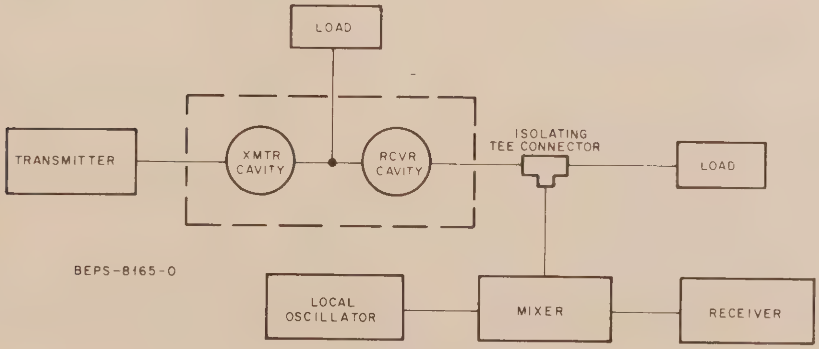

LOAD
TRANSMITTER
XMTR CAVITY
RCVR CAVITY
ISOLATING TEE CONNECTOR
LOAD
BEPS-8165-0
LOCAL OSCILLATOR
MIXER
RECEIVER

Figure 8.
Method 2 Receiver Branch Reject Test Set-Up

(e) Tune both cavities for minimum insertion loss by adjusting the tuning rod screw.

(f) Tune the signal generator and the receiver to the lower notch frequency.

(g) Tune the left-hand cavity for maximum attenuation by using procedure 5.f.

(h) Tune the signal generator and the receiver to the higher notch frequency.

(i) Tune the right-hand cavity for maximum attenuation by using procedure 5.f.

(j) Repeat steps (c) through (i) but only tune the trimmer capacitors when tuning the notches.

e. Minor "Touch-Up" Procedures (Models T1485A, AF and T1487A, AF)

(1) Method A

(a) Using the Recommended Test Equipment given for Method 1, tune the signal generator and the receiver to the duplex receive frequency.

(b) Connect the signal generator to the antenna port and the receiver to the right-hand port.

(c) Tune the right-hand cavity(s) for minimum insertion loss by adjusting the tuning rod screw.

(d) Tune the signal generator and the receiver to the duplex transmit frequency.

(e) Connect the receiver to the left-hand port.

(f) Tune the left-hand cavity(s) for minimum insertion loss by adjusting the tuning rod screw.

(g) Connect the receiver to the right-hand port.

(h) Tune the trimmer capacitor(s) on the right-hand cavity(s) for maximum attenuation.

(i) Tune the signal generator and the receiver to the duplex receive frequency.

(j) Connect the receiver to the left-hand port.

(k) Tune the trimmer capacitor(s) on the left-hand cavity(s) for maximum attenuation.

(2) Method B

(a) Using the Recommended Test Equipment given for Method 2, connect the equipment as shown in Figure 5.

(b) Tune the left-hand cavity(s) for a maximum power reading on the wattmeter by adjusting the tuning rod screw.

(c) Connect the equipment as shown in Figure 6.

(d) Tune the signal generator to the receive frequency.

(e) Tune the right-hand cavity(s) for a minimum insertion loss (maximum signal at the receiver) by adjusting the tuning rod screw.

(f) Connect the equipment as shown in Figure 7.

(g) Tune the trimmer capacitor(s) on the left-hand cavity(s) for maximum attenuation.

(h) Connect the equipment as shown in Figure 8.

(i) Set the local oscillator source to the exact duplex frequency separation.

(j) Tune the trimmer capacitor(s) on the right-hand cavity(s) for maximum attenuation.

f. Tuning the Notch

(1) If the Notch (Reject) Frequency is Below the Pass Frequency:

(a) Move the sliding screws as far apart as possible and then tighten the screws.

(b) Tune the trimmer capacitor for maximum attenuation at the notch frequency.

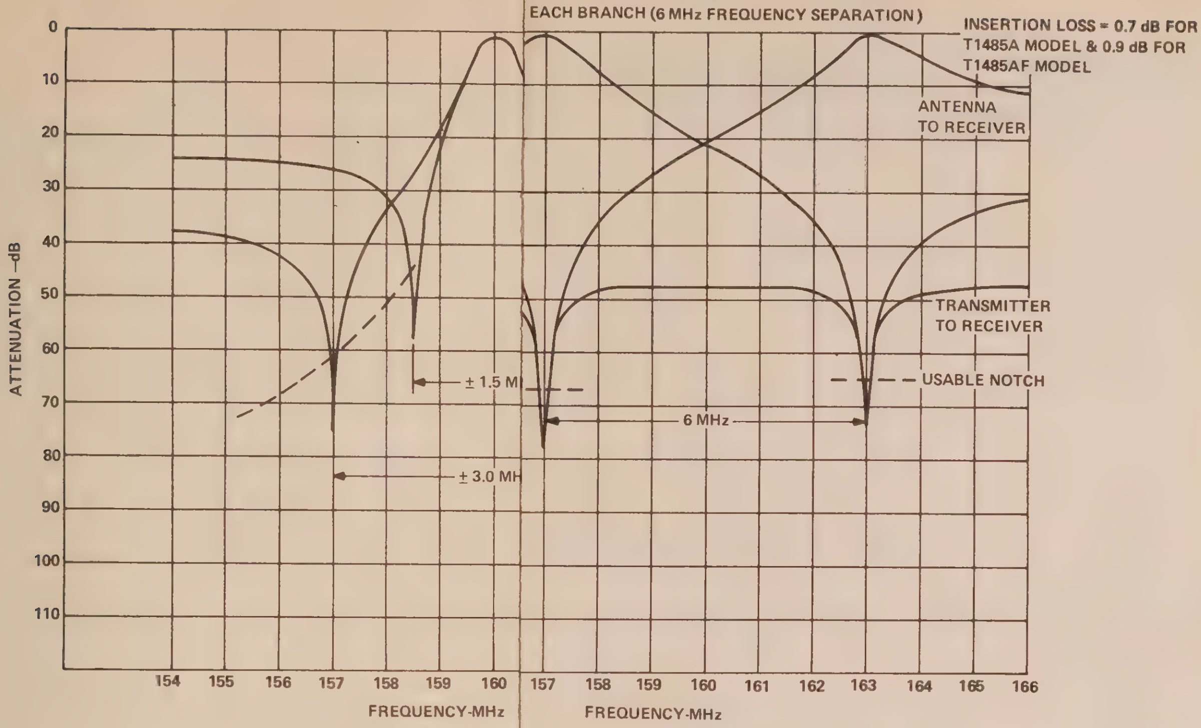
(2) If the Notch (Reject) Frequency is Above the Pass Frequency:

(a) Turn the trimmer capacitor completely counterclockwise and then clockwise two full turns.

(b) Adjust the sliding screws for maximum attenuation at the notch frequency and then tighten the screws.

(c) Tune the trimmer capacitor for maximum attenuation at the notch frequency.

T1482A DUAL-REJEC F PASS-REJECT DUPLEXER



A
EL

EEPS-8176-O

(e) Tune both cavities for minimum insertion loss by adjusting the tuning rod screw.

(f) Tune the signal generator and the receiver to the lower notch frequency.

(g) Tune the left-hand cavity for maximum attenuation by using procedure 5.f.

(h) Tune the signal generator and the receiver to the higher notch frequency.

(i) Tune the right-hand cavity for maximum attenuation by using procedure 5.f.

(j) Repeat steps (c) through (i) but only tune the trimmer capacitors when tuning the notches.

e. Minor "Touch-Up" Procedures (Models T1485A, AF and T1487A, AF)

(1) Method A

(a) Using the Recommended Test Equipment given for Method 1, tune the signal generator and the receiver to the duplex receive frequency.

(b) Connect the signal generator to the antenna port and the receiver to the right-hand port.

(c) Tune the right-hand cavity(s) for minimum insertion loss by adjusting the tuning rod screw.

(d) Tune the signal generator and the receiver to the duplex transmit frequency.

(e) Connect the receiver to the left-hand port.

(f) Tune the left-hand cavity(s) for minimum insertion loss by adjusting the tuning rod screw.

(g) Connect the receiver to the right-hand port.

(h) Tune the trimmer capacitor(s) on the right-hand cavity(s) for maximum attenuation.

(i) Tune the signal generator and the receiver to the duplex receive frequency.

(j) Connect the receiver to the left-hand port.

(k) Tune the trimmer capacitor(s) on the left-hand cavity(s) for maximum attenuation.

(2) Method B

(a) Using the Recommended Test Equipment given for Method 2, connect the equipment as shown in Figure 5.

(b) Tune the left-hand cavity(s) for a maximum power reading on the wattmeter by adjusting the tuning rod screw.

(c) Connect the equipment as shown in Figure 6.

(d) Tune the signal generator to the receive frequency.

(e) Tune the right-hand cavity(s) for a minimum insertion loss (maximum signal at the receiver) by adjusting the tuning rod screw.

(f) Connect the equipment as shown in Figure 7.

(g) Tune the trimmer capacitor(s) on the left-hand cavity(s) for maximum attenuation.

(h) Connect the equipment as shown in Figure 8.

(i) Set the local oscillator source to the exact duplex frequency separation.

(j) Tune the trimmer capacitor(s) on the right-hand cavity(s) for maximum attenuation.

f. Tuning the Notch

(1) If the Notch (Reject) Frequency is Below the Pass Frequency:

(a) Move the sliding screws as far apart as possible and then tighten the screws.

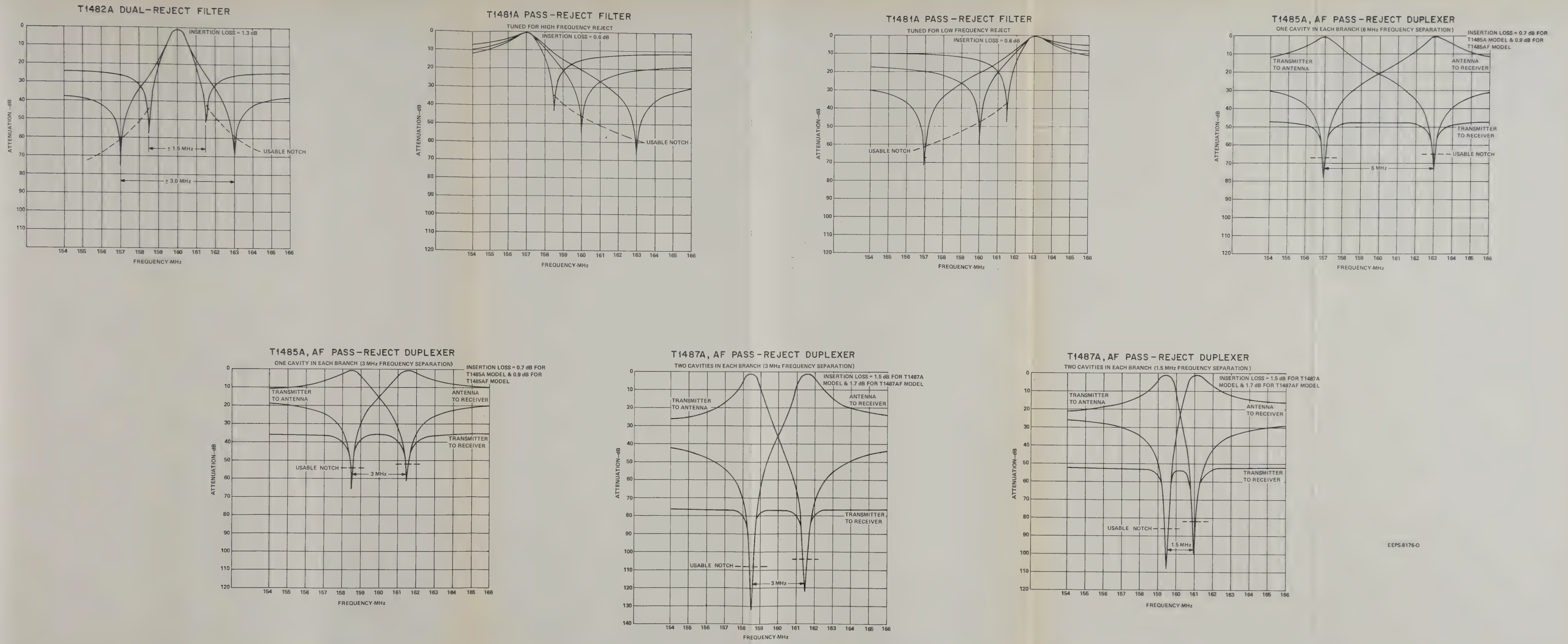
(b) Tune the trimmer capacitor for maximum attenuation at the notch frequency.

(2) If the Notch (Reject) Frequency is Above the Pass Frequency:

(a) Turn the trimmer capacitor completely counterclockwise and then clockwise two full turns.

(b) Adjust the sliding screws for maximum attenuation at the notch frequency and then tighten the screws.

(c) Tune the trimmer capacitor for maximum attenuation at the notch frequency.



REFERENCE
SYMBOL

PARTS L
TLN5900A M
TLN5993A M

This parts li
appear the n
in the descri

C100

CR100, 101

J1

LS1

M100

P100
P101
P102

R100
R101
R102

S1
S2, 3

"COMPA-STATION" METERING & INTERCOM

MODELS TLN1857A AND TLN1886A

INTERCOM

MODEL TLN1745A

FUNCTION -

--Models TLN1857A and TLN1886A provide built-in metering of over 20 major test points in the transmitter and receiver(s), plus intercom between the station and the remote control point.

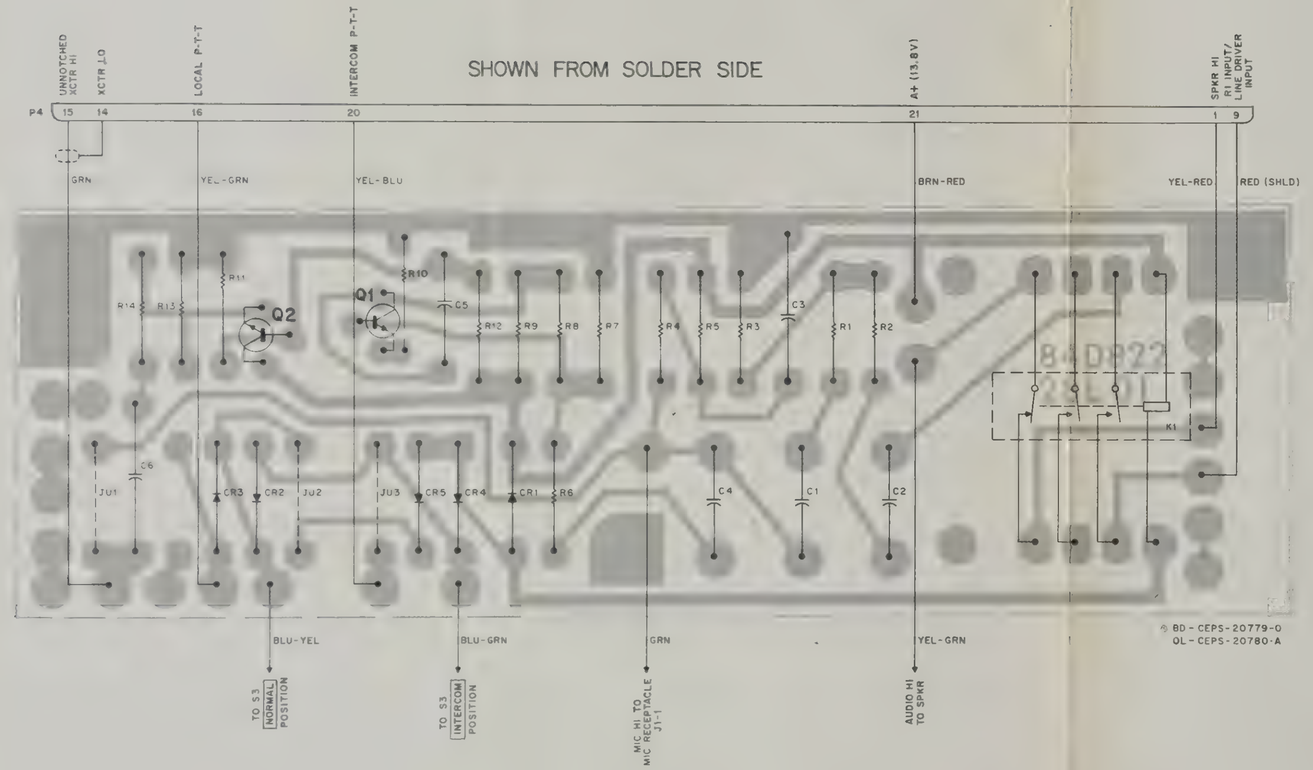
--Model TLN1745A provides intercom between the station and the remote control point.

METER SELECT TABLE

P102 METER PLUG CONNECTED TO	METER SELECTOR SWITCH			LOW BAND–MID BAND TLN1886A/TLN1887A		HIGH BAND TLN1857/TLN1859A		820 MHz/UHF TLN1857A/TLN1859A	
	MTR.	NO.	POS.	POL.	FUNCTION METERED	POL.	FUNCTION METERED	POL.	FUNCTION METERED
RCVR AND IF BOARD	RCVR	1	1	REV	EXTENDER CHANNEL ELEMENT	REV	–	FWD	CHANNEL ELEMENT OUTPUT
		2	2	REV	–	REV	–	FWD	FIRST DOUBLER OUTPUT
		3	3	REV	CHANNEL ELEMENT OUTPUT	REV	CHANNEL ELEMENT OUTPUT	FWD	SECOND DOUBLER OUTPUT
		4+	4	REV	DISCRIMINATOR OUTPUT	REV	DISCRIMINATOR OUTPUT	FWD	DISCRIMINATOR OUTPUT
		4–	5	REV	DISCRIMINATOR OUTPUT	REV	DISCRIMINATOR OUTPUT	FWD	DISCRIMINATOR OUTPUT
		5	6	REV	THIRD IF OUTPUT AND LIMITER OUTPUT	REV	THIRD IF OUTPUT AND LIMITER OUTPUT	FWD	LIMITER OUTPUT
POWER AMP	PWR AMP	1	7	FWD	P.A. INPUT	REV	PA INPUT	FWD	PREDRIVER CURRENT
		2	8	FWD	–	REV	CONTROLLED AMP OUTPUT	FWD	25 W DRIVER CURRENT (75 W)
		3	9	FWD	–	REV	INPUT FINAL AMP 90/100 W/60 W PREDRIVER	FWD	FINAL AMP CURRENT (EXCEPT 12 W MODELS)
		4	10	FWD	CONTROL VOLTAGE	REV	INPUT FINAL AMP.	FWD	–
		5	11	FWD	FINAL AMPLIFIER CURRENT	REV	FINAL AMPLIFIER CURRENT	FWD	CONTROLLED (ADL) STAGE VOLTAGE FINAL AMPLIFIER CURRENT (12 W ONLY)
POWER CONTROL BOARD	POWER CONT.	5	12	FWD	CONTROL VOLTAGE	FWD	CONTROL VOLTAGE	FWD	ADL VOLTAGE (ALL OTHERS)
		3	13	FWD	–		–	FWD	ADL VOLTAGE NOT USED (800 MHz ONLY)
		2	14	FWD	REFLECTED POWER	FWD	REFLECTED POWER	FWD	REFLECTED POWER
		1	15	FWD	FORWARD POWER	FWD	FORWARD POWER	FWD	FORWARD POWER
–	–	–	16		UNUSED		UNUSED		UNUSED
EXCITER	EXCTR	5	17	FWD	SECOND AMPLIFIER – (LB) DRIVER INPUT – (MB)	FWD	EXCITER OUTPUT	FWD	EXCITER OUTPUT
		4	18	FWD	FIRST AMPLIFIER – (LB) DOUBLER INPUT – (MB)	FWD	FIRST DOUBLER INPUT	FWD	DOUBLER INPUT
		3	19	FWD	TRIPLER INPUT	FWD	TRIPLER INPUT	FWD	TRIPLER INPUT
		2	20	FWD	CHANNEL ELEMENT OUTPUT	FWD	CHANNEL ELEMENT OUTPUT	FWD	CHANNEL ELEMENT OUTPUT
		1	21	FWD	IDC AUDIO OUTPUT	FWD	IDC AUDIO OUTPUT	FWD	IDC AUDIO OUTPUT
	VOLT–METER	25 V	22	FWD	25 VOLTS FULL SCALE	FWD	25 VOLTS FULL SCALE	FWD	25 VOLTS FULL SCALE
		5 V	23	FWD	5 VOLTS FULL SCALE NOTE: METER IS LABELLED 0–50	FWD	5 VOLTS FULL SCALE NOTE: METER IS LABELLED 0–50	FWD	5 VOLTS FULL SCALE NOTE: METER IS LABELLED 0–50
	OFF	–	24		OFF		OFF		OFF

EPS–23014–A

METERING & INTERCOM


SHOWN FROM SOLDER SIDE
UNNOTCHED XCTR HI
XCTR LO
LOCAL P-T-T
INTERCOM P-T-T
A+ (13.8V)
SPKR HI
R1 INPUT/ LINE DRIVER INPUT
P4
15
14
16
20
21
1
9
GRN
YEL-GRN
YEL-BLU
BRN-RED
YEL-RED
RED (SHLD)
Q1
Q2
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
C1
C2
C3
C4
C5
C6
CR1
CR2
CR3
CR4
CR5
JU1
JU2
JU3
K1
BLU-YEL
BLU-GRN
GRN
YEL-GRN
TO S3 NORMAL POSITION
TO S3 INTERCOM POSITION
MIC HI TO MIC RECEPTACLE J1-1
AUDIO HI TO SPKR
BD-CEPS-20779-O
OL-CEPS-20780-A

PARTS LIST

TLN5167A Intercom Board PL-5076-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uF:
C1, 2	8-82905G11	0.22 ±10%; 50 V
C3	23-865137	4.7 ±20%; 25 V
C4, 5	8-82905G11	0.22 ±10%; 50 V
C6	23-865137	4.7 ±20%; 25 V
		SEMICONDUCTOR DEVICE, diode:
CR1 thru 5	48-83654H01	silicon
		SWITCH, magnetic reed: 13.4 V DC:
K1	80-84157B02	dual-coil; 2 form "A", 1 form "B"; resistance of each coil 285 ohms ±10%
		TRANSISTOR:
Q1, 2	48-869642	NPN; type M9642
		RESISTOR, fixed: ±10%; 1/4 W:
R1	6-124C69	6.8k
R2	6-124C51	1.2k
R3	6-124C53	1.5k
R4	6-124C43	560
R5	6-124C49	1k
R6	6-124C69	6.8k
R7	6-124C83	27k
R8	6-124C93	68k
R9	6-124C43	560
R10	6-124C19	56
R11	6-124C85	33k
R12	6-124C75	12k
R13	6-124C49	1k
R14	6-124C45	680

"COMPA-STATION" METERING & INTERCOM

MODELS TLN1857A AND TLN1886A

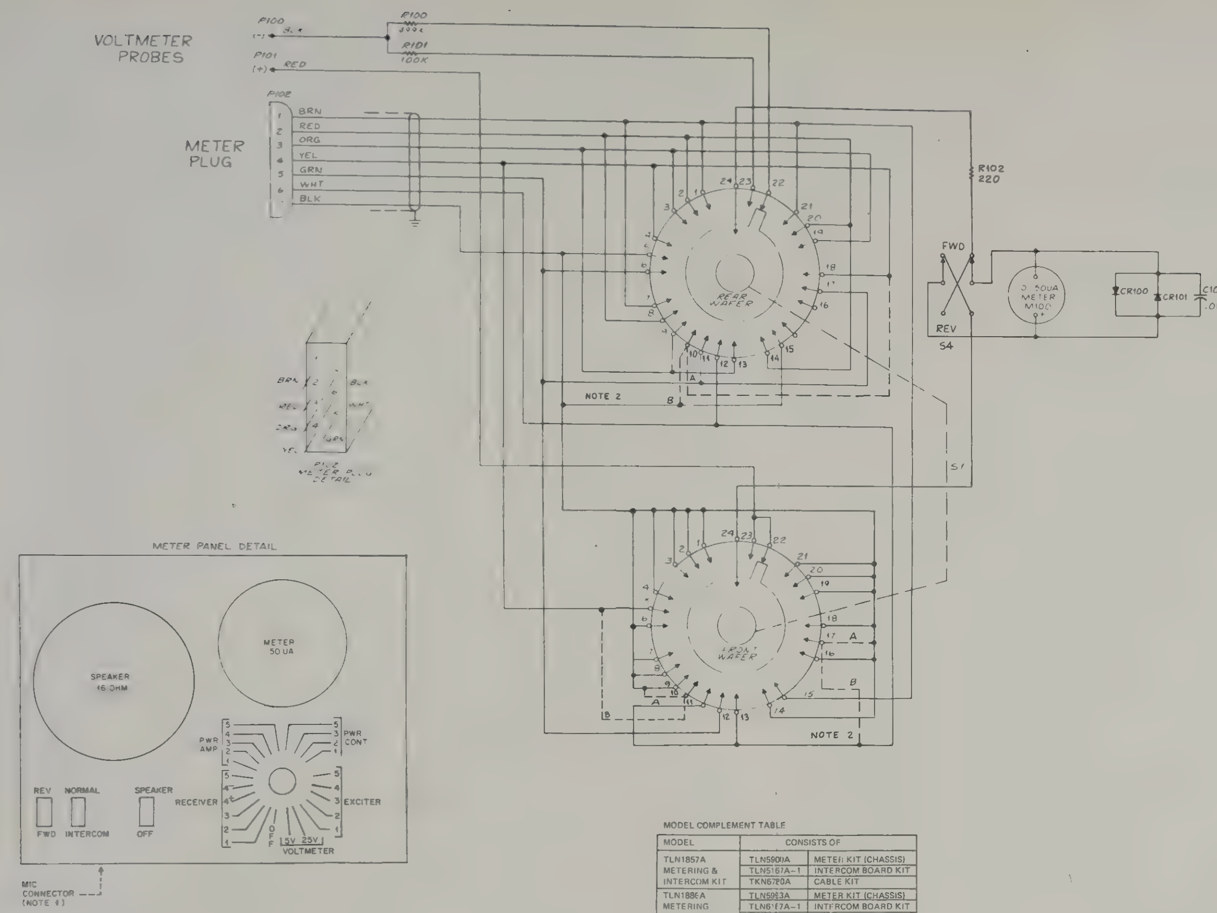
INTERCOM

MODEL TLN1745A

FUNCTION -

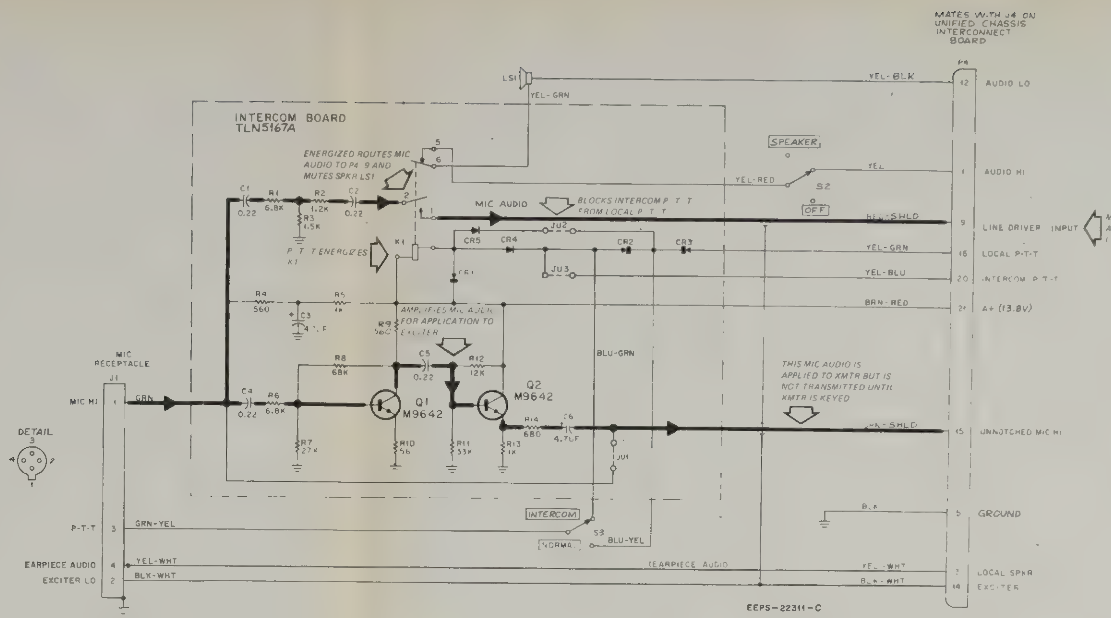
--Models TLN1857A and TLN1886A provide built-in metering of over 20 major test points in the transmitter and receiver(s), plus intercom between the station and the remote control point

--Model TLN1745A provides intercom between the station and the remote control point.


VOLTMETER PROBES
P100 (-) BLK
P101 (+) RED
R100 499K
R101 100K
METER PLUG
P102
BRN
RED
ORG
YEL
GRN
WHT
BLK
R102 220
FWD
REV
S4
50UA METER M100
CR100
CR101
C100 .01UF
REAR WAFER
FRONT WAFER
NOTE 2
S1
A
B
METER PANEL DETAIL
SPEAKER 16 OHM
METER 50 UA
PWR AMP
PWR CONT
RECEIVER
EXCITER
REV
FWD
NORMAL
INTERCOM
SPEAKER
OFF
5V 25V
VOLTMETER
MIC CONNECTOR (NOTE 1)

MODEL COMPLEMENT TABLE

MODEL	CONSISTS OF	
TLN1857A METERING & INTERCOM KIT	TLN5900A	METER KIT (CHASSIS)
	TLN5167A-1	INTERCOM BOARD KIT
	TKN6720A	CABLE KIT
TLN1886A METERING INTERCOM KIT	TLN5993A	METER KIT (CHASSIS)
	TLN6167A-1	INTERCOM BOARD KIT
	TKN6710A	CABLE KIT
TLN1745A INTERCOM KIT	TRN6089A	INTERCOM KIT (CHASSIS)
	TLN5167A-1	INTERCOM BOARD KIT
	TKN6780A	CABLE KIT


MATES WITH J4 ON UNIFIED CHASSIS INTERCONNECT BOARD
P4
INTERCOM BOARD
TLN5167A
LS1
YEL-BLK
YEL-GRN
AUDIO LO
SPEAKER
S2
OFF
YEL-RED
AUDIO HI
ENERGIZED ROUTES MIC AUDIO TO P4 9 AND MUTES SPKR LS1
MIC AUDIO
BLOCKS INTERCOM P-T-T FROM LOCAL P-T-T
LINE DRIVER INPUT
MIC AUDIO IS ULTIMATELY APPLIED TO REMOTE CONTROL POINT
LOCAL P-T-T
INTERCOM P-T-T
A+ (13.8V)
P-T-T ENERGIZES K1
AMPLIFIES MIC AUDIO FOR APPLICATION TO EXCITER
THIS MIC AUDIO IS APPLIED TO XMTR BUT IS NOT TRANSMITTED UNTIL XMTR IS KEYED
Q1 M9642
Q2 M9642
UNMATCHED MIC HI
GROUND
MIC RECEPTACLE
J1
MIC HI
DETAIL
P-T-T
EARPIECE AUDIO
EXCITER LO
GRN-YEL
YEL-WHT
BLK-WHT
INTERCOM
NORMAL
S3
BLU-YEL
EARPIECE AUDIO
LOCAL SPKR
EXCITER
EEPS-22311-C

NOTE
WITH 12 W STATIONS, FINAL PA CURRENT IS METERED AT PWR CONT MTR 5. WITH ALL OTHER STATIONS, FINAL PA CURRENT IS METERED AT PA MTR 3.

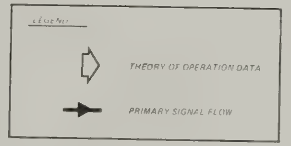
NOTE:

1. THIS OPTION REQUIRES THE USE OF A MOTOROLA MODEL TMN6071A MICROPHONE, OR EQUIVALENT.

JUMPER TABLE

JUMPER	NORMAL	WHEN "SPECTRA TAC" IS ADDED (CUT CR2)
JU1	OUT	OUT
JU2	OUT	IN
JU3	OUT	IN

2. LEADS A CONNECTED FOR TLN5900A. LEADS B CONNECTED FOR TLN5993A.


LEGEND
THEORY OF OPERATION DATA
PRIMARY SIGNAL FLOW

OPERATING INSTRUCTIONS

1. METERING

Step 1. Select the function to be metered with the METER switch.

Step 2. Select the chassis to be monitored by placing the metering plug (P102) into the metering receptacle of the receiver, exciter, power control board or the power amplifier.

NOTE
Metering plug P102 should be plugged in only when tuning. Unplug it when it is not being used.

Step 3. For receiver discriminator adjustment, use both 4(+) and 4(-) and adjust for meter zero.

Step 4. Refer to the Transmitter and Receiver sections of this manual for typical or minimum readings. Better yet, keep a log of all meter readings each time the station is serviced. Use the last set of readings as a reference and note any degradation in performance.

Step 5. To measure miscellaneous station voltages, use the voltmeter probes (P100 and P101) on either the 5 V or 25 V positions. Divide the 5 V full scale reading by 10 to obtain actual voltage and divide the 25 V full scale reading by 2 to obtain actual voltage.

2. INTERCOM

Step 1. Connect a test microphone to the microphone receptacle on the meter & intercom chassis.

Step 2. Place the SPEAKER-OFF switch in the SPEAKER position.

Step 3. Place the NORMAL-INTERCOM switch in the INTERCOM position.

Step 4. The unit is now ready for intercom operation between the station and the remote control point. Close the PUSH-TO-TALK switch on the microphone and speak into the microphone to send a message. Release the button to listen; replies will be heard in the speaker. The console operator at the remote point must also switch to an intercom mode to prevent keying the station during replies.

Step 5. Return the SPEAKER-OFF switch to the OFF position before leaving the station unattended.

3. "ON-THE-AIR" TESTING

Step 1. Connect a test microphone to the microphone receptacle on the meter & intercom chassis.

Step 2. Place the SPEAKER-OFF switch in the SPEAKER position.

Step 3. Place the NORMAL-INTERCOM switch in the NORMAL position.

Step 4. The unit is now ready for "ON-THE-AIR" testing. If the microphone PUSH-TO-TALK switch is closed, the station's transmitter will be keyed. Speak into the microphone to transmit a message. Release the PUSH-TO-TALK switch to listen. Receiver audio will be heard on the speaker.

Step 5. Return the SPEAKER-OFF switch to OFF before leaving the station unattended.

4. MONITORING

To monitor audio quality, etc., place the SPEAKER-OFF switch in the SPEAKER position. Both receiver audio and line audio from the remote control point will be heard in the speaker.

METER SELECT TABLE

P102 METER PLUG CONNECTED TO	METER SELECTOR SWITCH			LOW BAND–MID BAND TLN1886A/TLN1887A		HIGH BAND TLN1857/TLN1859A		820 MHz/UHF TLN1867A/TLN1859A	
	MTR. NO.		POS.	POL.	FUNCTION METERED	POL.	FUNCTION METERED	POL.	FUNCTION METERED
RCVR AND IF BOARD	RCVR	1	1	REV	EXTENDER CHANNEL ELEMENT	REV	–	FWD	CHANNEL ELEMENT OUTPUT
		2	2	REV	–	REV	–	FWD	FIRST DOUBLER OUTPUT
		3	3	REV	CHANNEL ELEMENT OUTPUT	REV	CHANNEL ELEMENT OUT–PUT	FWD	SECOND DOUBLER OUTPUT
		4+	4	REV	DISCRIMINATOR OUTPUT	REV	DISCRIMINATOR OUTPUT	FWD	DISCRIMINATOR OUTPUT
		4–	5	REV	DISCRIMINATOR OUTPUT	REV	DISCRIMINATOR OUTPUT	FWD	DISCRIMINATOR OUTPUT
		5	6	REV	THIRD IF OUTPUT AND LIMITER OUTPUT	REV	THIRD IF OUTPUT AND LIMITER OUTPUT	FWD	LIMITER OUTPUT
POWER AMP	PWR AMP	1	7	FWD	P.A. INPUT	REV	PA INPUT	FWD	PREDRIVER CURRENT
		2	8	FWD	–	REV	CONTROLLED AMP OUTPUT	FWD	25 W DRIVER CURRENT (75 W)
		3	9	FWD	–	REV	INPUT FINAL AMP 90/100 W/60 W PREDRIVER	FWD	FINAL AMP CURRENT (EXCEPT 12 W MODELS)
		4	10	FWD	CONTROL VOLTAGE	REV	INPUT FINAL AMP.	FWD	–
		5	11	FWD	FINAL AMPLIFIER CURRENT	REV	FINAL AMPLIFIER CUR–RENT	FWD	CONTROLLED (ADL) STAGE VOLTAGE FINAL AMPLIFIER CURRENT (12 W ONLY)
POWER CONTROL BOARD	POWER CONT.	5	12	FWD	CONTROL VOLTAGE	FWD	CONTROL VOLTAGE	FWD	ADL VOLTAGE (ALL OTHERS)
		3	13	FWD	–		–	FWD	ADL VOLTAGE NOT USED (800 MHz ONLY)
		2	14	FWD	REFLECTED POWER	FWD	REFLECTED POWER	FWD	REFLECTED POWER
		1	15	FWD	FORWARD POWER	FWD	FORWARD POWER	FWD	FORWARD POWER
–	–	–	16		UNUSED		UNUSED		UNUSED
EXCITER	EXCTR	5	17	FWD	SECOND AMPLIFIER – (LB) DRIVER INPUT – (MB)	FWD	EXCITER OUTPUT	FWD	EXCITER OUTPUT
		4	18	FWD	FIRST AMPLIFIER – (LB) DOUBLER INPUT – (MB)	FWD	FIRST DOUBLER INPUT	FWD	DOUBLER INPUT
		3	19	FWD	TRIPLER INPUT	FWD	TRIPLER INPUT	FWD	TRIPLER INPUT
		2	20	FWD	CHANNEL ELEMENT OUTPUT	FWD	CHANNEL ELEMENT OUTPUT	FWD	CHANNEL ELEMENT OUTPUT
		1	21	FWD	IDC AUDIO OUTPUT	FWD	IDC AUDIO OUTPUT	FWD	IDC AUDIO OUTPUT
	VOLT–METER	25 V	22	FWD	25 VOLTS FULL SCALE	FWD	25 VOLTS FULL SCALE	FWD	25 VOLTS FULL SCALE
		5 V	23	FWD	5 VOLTS FULL SCALE NOTE: METER IS LABELLED 0–50	FWD	5 VOLTS FULL SCALE NOTE: METER IS LABELLED 0–50	FWD	5 VOLTS FULL SCALE NOTE METER IS LABELLED 0–50
	OFF	–	24		OFF		OFF		OFF

EPS–23014–A

RENCE MBOL	MOTOROLA PART NO.	DESCRIPTION

TS LIST

5901A Meter Kit
5994A Meter Kit

NOTE

parts list covers two meter kits. Where differences ar the model number of the applicable kit is indicated e description column.

PL-5078-O

		DIODE: (SEE NOTE)
	48-82392B03	silicon
		CONNECTOR, receptacle:
	9-830418	4-contact
		TRANSISTOR: (SEE NOTE)
	48-869571	PNP; type M9571
		CONNECTOR, plug:
	29-82676C01	test probe; BLACK
	29-82676C02	test probe; RED
	28-84208B01	7-contact
		RESISTOR, fixed: ±10%; 1/2 W: unless otherwise stated
		NOT USED
	17-82177B04	5; 5 W
	6-124A33	220
10	6-84640C61	499k ±1%
	6-125C17	47
	6-124A77	15k ±5%; 1/4 W
	6-124A57	2.2k ±5%; 1/4 W
	6-125C15	39
	6-125A39	390
	6-12756D88	100k ±1%
	6-125A33	220 ±5%
		SWITCH:
	40-83158C01	rotary; 2 section
3	40-83890A01	slide; dpdt
	40-811751	toggle; dpdt
	40-83890A01	slide; dpdt
	NON-REFERENCED ITEMS	
	1-80775B55	CABLE ASSEMBLY includes:
	3-129674	SCREW, machine: 4-40 x 3/16"; 2 used
	3-132341	SCREW, machine: 4-36 x 1/4" 2 used
	15-83947K01	COVER, connector: 2 used
	30-83678K01	CLAMP, cable; 2 used
		CONNECTOR P102
	1-80775B60	VOLTMETER PROBES includes:
		CONNECTORS P100 & P101
	1-80792B39	SWITCH ASSEMBLY, wired (TLN5901A)
	1-80795B12	SWITCH ASSEMBLY, wired (TLN5994A) includes:
		SWITCH S1
	1-80793B03	CHASSIS ASSEMBLY includes:
	4-7555	WASHER, flat: .128 x .250 x .033"; 3 used
	27-83400K02	CHASSIS, metering
	29-115147	LUG, soldering: #5
	31-490101	TERMINAL STRIP: 2-terminal; 2 used
	42-871184	CLIP, mounting; 3 used
	2-7018	NUT, hex: 3/8-32 x 1/2 x 3/32
	2-115190	NUT, hex: 15/32-32 x 9/16 x 5/64"
	2-121841	NUT, hex: 6-32 x 5/16 x 7/64"
	2-83896G01	NUT, special: 13/16-27 x .905 x .110"
	3-134185	SCREW, tapping: 6-32 x 1/4: 2 used
	3-134212	SCREW, tapping: 4-40 x 5/16; 3 used
	3-136934	SCREW, tapping: 6-32 x 3/8"
	4-7698	WASHER, lock: #3/8 (internal tooth)
	4-7699	WASHER, lock: #13/16 (internal tooth)
	4-8324	WASHER, lock: #15/32 (split)
	14-84717F01	INSULATOR: .68 x .40"
	29-5279	LUG, soldering: #7/8
	31-835961	TERMINAL STRIP, 18-terminal
	36-82630H01	KNOB, control
	42-890499	CLAMP, cable: 3.18 x .62"
	42-10217A02	STRAP, cable harness

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

TKN6886A Cable Kit PL-5207-A

		CONNECTOR:
P4	-	includes:
	9-84151B03	CONTACT, receptacle: 12 used
	14-84556B02	HOUSING, connector
	NON-REFERENCED ITEMS	
	14-859051	INSULATOR, lug: .315 x .945"; 6 used
	29-5247	LUG, soldering: #1/4 L; 4 used
	29-824456	LUG, ring tongue: 2 used
	29-859118	LUG, receptacle: .295 x .750"; 6 used
	37-82603D60	SLEEVE, numbered; blank
	39-10184A24	CONTACT, female
	42-10217A02	STRAP, cable harness; 3.62" lg.; 28 used
	42-10217A10	STRAP, cable harness; 7.78" lg.; 4 used
	9-84234E10	JACK, test; white; 3 used

TLN5134A Meter Panel PL-2233-A

		LIGHT, indicator:
DS1	65-83183G02	includes lamp and GRN lens
DS2	65-83183G04	includes lamp and RED lens
		LOUDSPEAKER, permanent magnet:
LS1	50-83562A01	dynamic type; 4"; square; 4 ohms voice coil impedance
		METER, electrical: 50 uA movements:
M1	72-84864B10	scale: 0-25 volts/amps
M2	72-84864B09	scale: 0-50 microamperes
	NON-REFERENCED ITEMS	
	13-84616G01	GRILLE, speaker
	13-83207F01	CLOTH, speaker grille
	42-83112A01	CLIP, indicator light retaining; 2 used
	2-7009	NUT, hex: 10-32 x 3/8 x 1/8"; 4 used
	3-119916	SCREW, machine: 10-32 x 7/16" 4 used
	3-131964	SCREW, tapping: 6-32 x 3/8; 12 used
	4-7658	WASHER, lock: #10 (split); 4 used
	7-84620G01	FRAME, top
	7-84620G03	FRAME, bottom
	7-84620G05	FRAME, end: 2 used
	13-83054C10	GRILLE, meter panel
	64-83152C03	PANEL, meter

TRN6189A Intercom Chassis Kit PL-3452-O

		CONNECTOR, receptacle:
J1	9-830418	4-contact
		SPEAKER
LS1	50-84710G01	3"; 16 ohm
		SWITCH, slide:
S2, 3	40-11589	SPST
	NON-REFERENCED ITEMS	
	1-80775B59	CHASSIS (riveted) incl. ref. item S2 and S3
	1-80775B51	COVER ASSEMBLY
	2-132616	LOCKNUT, speaker (No. 6-32) 4 req'd.
	2-83896G01	NUT, hex (used with J1)
	4-7699	LOCKWASHER (used with J1)
	5-483208	GROMMET, rubber
	35-84530G01	GRILLE, speaker
	42-82143C02	CLAMP, cable (1/4")
	42-10217A02	TY-WRAP. cable: 4 req'd.
	3-134169	SCREW, machine: No. 4-40 x 1/4"; 7 req'd.
	3-129498	SCREW, machine: No. 6-32 x 5/16"; 4 req'd.
	29-115147	LUG, solder (No. 5)

STATION HARDWARE AND POWER CABLE KITS

PARTS LIST

TLN5896A Hardware Kit, 1-Receiver
TLN5897A Hardware Kit, 2-Receiver

NOTE

This parts list covers two receiver hardware kits. Where differences appear the model number of the applicable kits is indicated in the description column.

PL-5146-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80709B39	SHIELD ASSEMBLY, receiver (TLN5896A 1 used; TLN5897A 2 used) includes:
	2-10101A53	NUT, spring: .280 x .020''; 4 used
	26-84081C04	INSERT, shield
	26-84405B01	SHIELD, receiver
	41-84811B01	SPRING, ground
	46-84090C01	STUD, retainer; 4 used
	1-80728B57	SHIELD ASSEMBLY, Audio & Squelch (TLN5896A 1 used; TLN5897A 2 used) includes:
	2-10101A53	NUT, spring; .280 x .020''; 4 used
	26-84043E01	SHIELD (4-hole)
	26-84981F01	SHIELD (2-hole)
	46-84090C01	STUD, retainer
	1-80731B73	SHIELD ASSEMBLY, Exciter includes:
	2-10101A53	NUT, spring: .280 x .020''; 4 used
	26-84053E01	SHIELD, exciter
	26-84053E04	INSERT
	46-84090C01	STUD, retainer; 4 used
	1-80775B77	BRACKET ASSEMBLY includes:
	7-82898K01	BRACKET, connector mtg.
	1-80792B92	COVER ASSEMBLY, channel element (TLN5896A 1 used; TLN5897A 2 used) includes:
	1-80792B93	COVER SUBASSEMBLY includes:
	64-82673L02	COVER
	3-138162	SCREW, tapping: 4-40 x 3/8'' 4 used
	42-84284B01	RETAINER, screw; 4 used
	75-82902K01	PAD, rubber
	2-119913	NUT, hex; 8-32 x 11/32 x 1/8''; 3 used
	2-82360B07	NUT, speed: 1/4 - 14 (TLN5896A 18 used: TLN5897A 22 used)
	3-122777	SCREW, machine: 8-32 x 1/2''; 3 used
	3-134268	SCREW, tapping: 4-40 x 7/16''; 2 used
	3-135038	SCREW, tapping: 1/4-14 x 3/4'' (TLN5896A 18 used; TLN5897A 22 used)
	3-138162	SCREW, tapping; 4-40 x 3/8''
	3-139495	SCREW, tapping; 6-20 x 5/16'' 2 used
	7-82683K01	BRACKET, filter
	13-813618	DECAL, patent number
	14-82903K01	INSULATOR; 2.68 x 1.25''
	26-82911K01	HEAT SINK
	33-83051K01	NAMEPLATE
	42-10217A02	STRAP, cable harness; 3.67'' lg.; 10 used
	42-10217A10	STRAP, cable harness; 7.78'' lg.; 3 used
	42-84284B01	RETAINER, screw
	54-842366	LABEL, replacement parts
	54-850440	LABEL, FCC
	54-83040C01	LABEL, audio
	54-84857B01	LABEL, wattmeter
	55-84300B01	HANDLE; (TLN5896A 4 used; TLN5897A 6 used)
	66-84387C01	TOOL, universal tuning
	66-84690C01	TOOL, contact removal

MOTOROLA INC.
Communications Division

service publications
1301 E. Algonquin Road, Schaumburg, IL 60196

UPRIGHT STATION METERING & INTERCOM

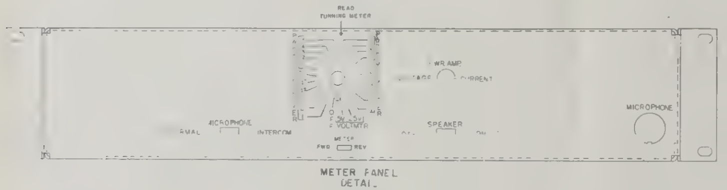
MODELS TLN1859A AND TLN1887A

FUNCTION -

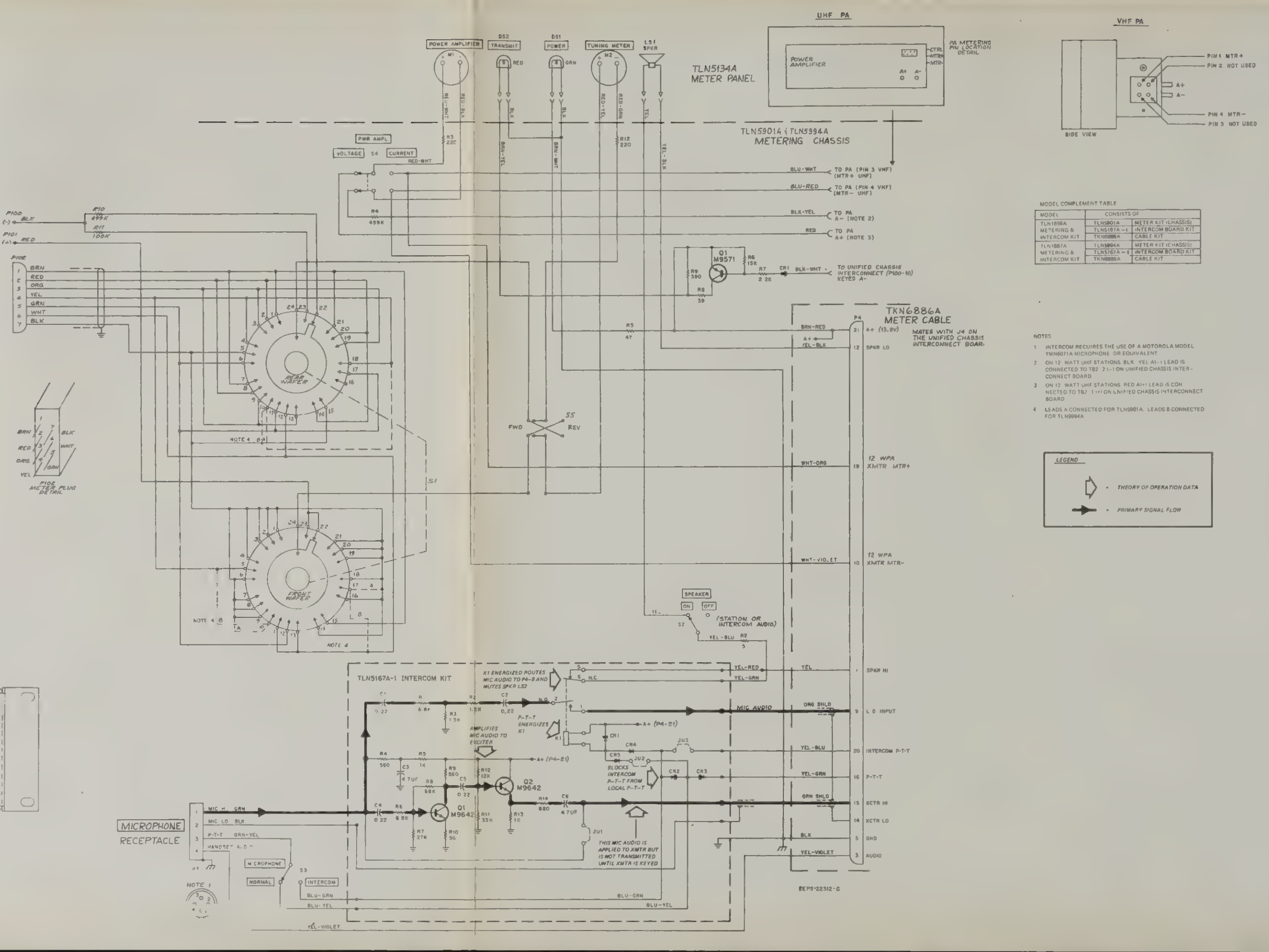
Provides built-in metering of over 20 major test points in the transmitter and receiver(s). Plus intercom between the station and the remote control point.

METER SELECT TABLE

METER PLUG CONNECTED TO	METER SELECTOR SWITCH MTR	NO	POS.	LOW BAND–MID BAND TLN1886A/TLN1887A POL	FUNCTION METERED	HIGH BAND TLN1857/TLN1858A POL.	FUNCTION METERED	820 MHz/UHF TLN1857A/TLN1858A POL.	FUNCTION METERED
RCVR AND [illegible] BOARD	RCVR	1	1	REV	EXTENDER CHANNEL ELEMENT	REV	–	FWD	CHANNEL ELEMENT OUTPUT
		2	2	REV	–	REV	–	FWD	FIRST DOUBLER OUTPUT
		3	3	REV	CHANNEL ELEMENT OUTPUT	REV	CHANNEL ELEMENT OUTPUT	FWD	SECOND DOUBLER OUTPUT
		4+	4	REV	DISCRIMINATOR OUTPUT	REV	DISCRIMINATOR OUTPUT	FWD	DISCRIMINATOR OUTPUT
		4–	5	REV	DISCRIMINATOR OUTPUT	REV	DISCRIMINATOR OUTPUT	FWD	DISCRIMINATOR OUTPUT
		[illegible]	[illegible]	REV	THIRD IF OUTPUT AND LIMITER OUTPUT	REV	THIRD IF OUTPUT AND LIMITER OUTPUT	FWD	LIMITER OUTPUT
[illegible]	PWR AMP			[illegible]	PA INPUT	REV	PA INPUT	FWD	PREDRIVER CURRENT
			[illegible]	[illegible]	–	REV	CONTROLLED AMP OUTPUT	FWD	25 W DRIVER CURRENT (75 W)
			[illegible]	[illegible]		REV	INPUT FINAL AMP [illegible]	FWD	FINAL AMP CURRENT (EXCEPT [illegible])
		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] TAGE [illegible]
[illegible] CONTROL BOARD	[illegible] CONT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		3	13	FWD	–		–	FWD	ADC VOLTAGE NOT USED (800 MHz ONLY)
		[illegible]	[illegible]	[illegible]	REFLECTED POWER	FWD	REFLECTED POWER	[illegible]	REFLECTED POWER
		1	15	FWD	FORWARD POWER	FWD	FORWARD POWER	[illegible]	FORWARD POWER
–	–	–	16		UNUSED		UNUSED		UNUSED
[illegible]	EXCTR	5	17	FWD	SECOND AMPLIFIER – (LB) DRIVER INPUT (MB)	FWD	EXCITER OUTPUT	FWD	EXCITER OUTPUT
		4		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	DOUBLER INPUT
			[illegible]	[illegible]	[illegible]	[illegible]	TRIPLER INPUT	[illegible]	[illegible] INPUT
			[illegible]	[illegible]	[illegible]	[illegible]	CHANNEL ELEMENT [illegible]	[illegible]	CHANNEL ELEMENT [illegible]
		1	21	FWD	IDC AUDIO OUTPUT	FWD	IDC AUDIO OUTPUT	FWD	IDC AUDIO OUTPUT
	VOLT-METER	25 V	[illegible]	FWD	25 VOLTS FULL SCALE	FWD	25 VOLTS FULL SCALE	FWD	25 VOLTS FULL SCALE
				[illegible]	[illegible] 0–50	[illegible]	[illegible] METER [illegible] 0–50	[illegible]	[illegible] FULL SCALE [illegible] METER S [illegible] 0–50
	OFF	–	24		OFF		OFF		OFF



METER PANEL DETAIL



MODEL COMPLEMENT TABLE

MODEL	CONSISTS OF	
TLN1859A METERING & INTERCOM KIT	TLN5901A	METER KIT (CHASSIS)
	TLN5167A-1	INTERCOM BOARD KIT
	TKN6886A	CABLE KIT
TLN1887A METERING & INTERCOM KIT	TLN5994A	METER KIT (CHASSIS)
	TLN5167A-1	INTERCOM BOARD KIT
	TKN6886A	CABLE KIT

NOTES

1. INTERCOM REQUIRES THE USE OF A MOTOROLA MODEL TMN6071A MICROPHONE OR EQUIVALENT
2. ON 12 WATT UHF STATIONS, BLK YEL A(-) LEAD IS CONNECTED TO TB2 2 (-) ON UNIFIED CHASSIS INTERCONNECT BOARD
3. ON 12 WATT UHF STATIONS RED A(+) LEAD IS CONNECTED TO TB2 1 (+) ON UNIFIED CHASSIS INTERCONNECT BOARD
4. LEADS A CONNECTED FOR TLN5901A. LEADS B CONNECTED FOR TLN5994A

OPERATING INSTRUCTIONS

1. METERING

Step 1. Tuning Meter Usage -- Select the function to be metered with the meter switch. Next, select the chassis to be monitored by placing the metering plug (P102) into the metering receptacle of the receiver, exciter, power control board, or the power amplifier. NOTE: Metering plug P102 should be plugged in only when tuning. Unplug it when it is not being used. For receiver discriminator adjustment, use both 4(+) and 4(-) and adjust for meter zero.

Step 2. PWR AMP Meter Usage -- Select PA current/voltage monitoring by placing the VOLTAGE/CURRENT switch in the applicable position.

Step 3. Refer to the Transmitter and Receiver sections of this manual for typical or minimum readings. Better yet, keep a log of all meter readings each time the station is serviced. Use the last set of readings as a reference and note any degradation in performance.

Step 4. Voltmeter Usage -- Use either the 5 V or 25 V scales as applicable. Divide the 5 V full scale reading by 10 to obtain actual voltage. Divide the 25 V full scale reading by 2 to obtain actual voltage.

2. INTERCOM

Step 1. Connect a test microphone to the microphone receptacle on the meter & intercom chassis.

Step 2. Place the SPEAKER switch in the ON position.

Step 3. Place the NORMAL-INTERCOM switch in the INTERCOM position.

Step 4. The unit is now ready for intercom operation between the station and the remote control point. Close the PUSH-TO-TALK switch on the microphone and speak into the microphone to send [illegible] replies will be heard in the speaker. The console operator at the remote point must also switch to an intercom mode to prevent keying the station during replies.

Step 5. Return the SPEAKER switch to the OFF position before leaving the station unattended.

3. "ON-THE-AIR" TESTING

Step 1. Connect a test microphone to the microphone receptacle on the meter & intercom chassis.

Step 2. Place the SPEAKER switch in the ON position.

Step 3. Place the NORMAL-INTERCOM in the NORMAL position.

Step 4. The unit is now ready for "on-the-air" testing. If the microphone PUSH-TO-TALK switch is closed, the station's transmitter will be keyed. Speak into the microphone to transmit a message. Release the PUSH-TO-TALK switch to listen. Receiver audio will be heard on the speaker.

Step 5. Return the SPEAKER switch to OFF before leaving the station unattended.

4. MONITORING

To monitor audio quality, etc. place the SPEAKER switch in the ON position. Both receiver audio and line audio from the remote control point will be heard in the speaker.

PARTS LIST

TLN5901A Meter Kit
TLN5994A Meter Kit

NOTE

This parts list covers two meter kits. Where differences appear the model number of the applicable kit is indicated in the description column.

PL-5078-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		DIODE: (SEE NOTE)
CR1	48-82392B03	silicon
		CONNECTOR, receptacle:
J1	9-830418	4-contact
		TRANSISTOR: (SEE NOTE)
Q1	48-869571	PNP; type M9571
		CONNECTOR, plug:
P100	29-82676C01	test probe; BLACK
P101	29-82676C02	test probe; RED
P102	28-84208B01	7-contact
		RESISTOR, fixed: ±10%: 1/2 W: unless otherwise stated
R1		NOT USED
R2	17-82177B04	5; 5 W
R3	6-124A33	220
R4, 10	6-84640C61	499k ±1%
R5	6-125C17	47
R6	6-124A77	15k ±5%; 1/4 W
R7	6-124A57	2.2k ±5%; 1/4 W
R8	6-125C15	39
R9	6-125A39	390
R11	6-12756D88	100k ±1%
R12	6-125A33	220 ±5%
		SWITCH:
S1	40-83158C01	rotary; 2 section
S2, 3	40-83890A01	slide; dpdt
S4	40-811751	toggle; dpdt
S5	40-83890A01	slide; dpdt
	NON-REFERENCED ITEMS	
	1-80775B55	CABLE ASSEMBLY includes:
	3-129674	SCREW, machine: 4-40 x 3/16"; 2 used
	3-132341	SCREW, machine: 4-36 x 1/4"; 2 used
	15-83947K01	COVER, connector: 2 used
	30-83678K01	CLAMP, cable; 2 used
		CONNECTOR P102
	1-80775B60	VOLTMETER PROBES includes:
		CONNECTORS P100 & P101
	1-80792B39	SWITCH ASSEMBLY, wired (TLN5901A)
	1-80795B12	SWITCH ASSEMBLY, wired (TLN5994A) includes:
		SWITCH S1
	1-80793B03	CHASSIS ASSEMBLY includes:
	4-7555	WASHER, flat: .128 x .250 x .033"; 3 used
	27-83400K02	CHASSIS, metering
	29-115147	LUG, soldering: #5
	31-490101	TERMINAL STRIP: 2-terminal; 2 used
	42-871184	CLIP, mounting: 3 used
	2-7018	NUT, hex: 3/8-32 x 1/2 x 3/32
	2-115190	NUT, hex: 15/32-32 x 9/16 x 5/64"
	2-121841	NUT, hex: 6-32 x 5/16 x 7/64"
	2-83896G01	NUT, special: 13/16-27 x .905 x .110"
	3-134185	SCREW, tapping: 6-32 x 1/4: 2 used
	3-134212	SCREW, tapping: 4-40 x 5/16; 3 used
	3-136934	SCREW, tapping: 6-32 x 3/8"
	4-7698	WASHER, lock: #3/8 (internal tooth)
	4-7699	WASHER, lock: #13/16 (internal tooth)
	4-8324	WASHER, lock: #15/32 (split)
	14-84717F01	INSULATOR: .68 x .40"
	29-5279	LUG, soldering: #7/8
	31-835961	TERMINAL STRIP, 18-terminal
	36-82630H01	KNOB, control
	42-890499	CLAMP, cable: 3.18 x .62"
	42-10217A02	STRAP, cable harness

TKN6886A Cable Kit — PL-5207-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CONNECTOR:
P4	-	includes:
	9-84151B03	CONTACT, receptacle: 12 used
	14-84556B02	HOUSING, connector
	NON-REFERENCED ITEMS	
	14-859051	INSULATOR, lug: .315 x .945"; 6 used
	29-5247	LUG, soldering: #1 4 L, 4 used
	29-824456	LUG, ring tongue: 2 used
	29-859118	LUG, receptacle: .295 x .750 6 used
	37-82603D60	SLEEVE, numbered; blank
	39-10184A24	CONTACT, female
	42-10217A02	STRAP, cable harness; 3.62' lg.; 28 used
	42-10217A10	STRAP, cable harness; 7.78 lg.; 4 used
	9-84234E10	JACK, test: white; 3 used

TLN5134A Meter Panel — PL-[illegible]

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		LIGHT, indicator
DS1	65-83183G02	includes lamp and GRN lens
DS2	65-83183G04	includes lamp and RED lens
		LOUDSPEAKER, permanent magnet
LS1	50-83562A01	dynamic type, [illegible] square 4 ohms voice [illegible]
		METER, electrical [illegible] movements
M1	72-84864B10	scale [illegible]
M2	72-84864B09	scale: 0-50 microamperes
	NON-REFERENCED ITEMS	
	13-84616G01	GRILLE, speaker
	13-83207F01	CLOTH, speaker grille
	42-83112A01	CLIP, indicator light retaining: 2 used
	2-7009	NUT, hex: 10-32 x 3/8 x 1/8 4 used
	3-119916	SCREW, machine: 10-32 x 7/16" 4 used
	3-131964	SCREW, tapping: 6-32 x 3/8 12 used
	4-7658	WASHER, lock: #10 (split): 4 used
	7-84620G01	FRAME, top
	7-84620G03	FRAME, bottom
	7-84620G05	FRAME, end; 2 used
	13-83054C10	GRILLE, meter panel
	64-83152C03	PANEL, meter

TRN6189A Intercom [illegible]

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		[illegible]
J1	[illegible]	[illegible]
		[illegible]
LS1	50-84710G01	[illegible]
		[illegible]
S2, 3	40-11589	[illegible]
	NON-REF[illegible]	
	1-80775B59	[illegible]
	1-80775B51	COVER ASSEMBLY
	2-132616	LOCKNUT, speaker (No. 6-32) [illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	35-84530G01	[illegible]
	42-82143C02	[illegible]
	42-10217A02	[illegible] 4 req [illegible]
	3-134169	[illegible] 1/4"; 7 req d.
	3-129498	SCREW, machine: No. 6-32 x 5/16; 4 r[illegible]
	29-115147	LUG, solder (No. 5

68P81033E28-E
(Sheet 3 of 3)
2/24/78-UP

STATION HARDWARE AND POWER CABLE KITS

PARTS LIST

TLN5896A Hardware Kit, 1-Receiver
TLN5897A Hardware Kit, 2-Receiver

NOTE

This parts list covers two receiver hardware kits. Where differences appear the model number of the applicable kits is indicated in the description column.

PL-5146-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80709B39	SHIELD ASSEMBLY, receiver (TLN5896A 1 used; TLN5897A 2 used) includes:
	2-10101A53	NUT, spring: .280 x .020"; 4 used
	26-84081C04	INSERT, shield
	26-84405B01	SHIELD, receiver
	41-84811B01	SPRING, ground
	46-84090C01	STUD, retainer; 4 used
	1-80728B57	SHIELD ASSEMBLY, Audio & Squelch (TLN5896A 1 used; TLN5897A 2 used) includes:
	2-10101A53	NUT, spring; .280 x .020"; 4 used
	26-84043E01	SHIELD (4-hole)
	26-84981F01	SHIELD (2-hole)
	46-84090C01	STUD, retainer
	1-80731B73	SHIELD ASSEMBLY, Exciter includes:
	2-10101A53	NUT, spring: .280 x .020"; 4 used
	26-84053E01	SHIELD, exciter
	26-84053E04	INSERT
	46-84090C01	STUD, retainer; 4 used
	1-80775B77	BRACKET ASSEMBLY includes:
	7-82898K01	BRACKET, connector mtg.
	1-80792B92	COVER ASSEMBLY, channel element (TLN5896A 1 used; TLN5897A 2 used) includes:
	1-80792B93	COVER SUBASSEMBLY includes:
	64-82673L02	COVER
	3-138162	SCREW, tapping: 4-40 x 3/8" 4 used
	42-84284B01	RETAINER, screw; 4 used
	75-82902K01	PAD, rubber
	2-119913	NUT, hex; 8-32 x 11/32 x 1/8"; 3 used
	2-82360B07	NUT, speed: 1/4 - 14 (TLN5896A 18 used: TLN5897A 22 used)
	3-122777	SCREW, machine: 8-32 x 1/2"; 3 used
	3-134268	SCREW, tapping: 4-40 x 7/16"; 2 used
	3-135038	SCREW, tapping: 1/4-14 x 3/4" (TLN5896A 18 used; TLN5897A 22 used)
	3-138162	SCREW, tapping; 4-40 x 3/8"
	3-139495	SCREW, tapping; 6-20 x 5/16" 2 used
	7-82683K01	BRACKET, filter
	13-813618	DECAL, patent number
	14-82903K01	INSULATOR; 2.68 x 1.25"
	26-82911K01	HEAT SINK
	33-83051K01	NAMEPLATE
	42-10217A02	STRAP, cable harness; 3.67" lg.; 10 used
	42-10217A10	STRAP, cable harness; 7.78" lg.; 3 used
	42-84284B01	RETAINER, screw
	54-842366	LABEL, replacement parts
	54-850440	LABEL, FCC
	54-83040C01	LABEL, audio
	54-84857B01	LABEL, wattmeter
	55-84300B01	HANDLE; (TLN5896A 4 used; TLN5897A 6 used)
	66-84387C01	TOOL, universal tuning
	66-84690C01	TOOL, contact removal

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TRN6976A Hardware Kit, 1-Receiver
TRN6977A Hardware Kit, 2-Receiver

NOTE

This parts list covers 1- & 2-Receiver Hardware Kits. Where differences exist the model number of the applicable unit is given in the Description column. PL-5513-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80709B39	SHIELD ASSEMBLY, Receiver TRN6976A 1 used, TRN6977A 2 used includes:
	2-10101A53	NUT, spring: 4 used
	26-84081C04	INSERT
	26-84405B01	SHIELD, receiver
	41-84811B01	SPRING
	46-84090C01	STUD, retainer: 4 used
	1-80728B57	SHIELD ASSEMBLY, Audio & Squelch: TRN6976A 1 used, TRN6977A 2 used includes:
	2-10101A53	NUT, spring; 4 used
	26-84981F01	SHIELD
	46-84090C01	STUD, retainer: 4 used
	1-80731B73	SHIELD ASSEMBLY, Exciter includes:
	2-10101A53	NUT, spring: 4 used
	26-84053E01	SHIELD
	26-84053E04	INSERT
	46-84090C01	STUD, retainer: 4 used
	1-80792B92	COVER ASSEMBLY, Receiver Channel Element: TRN6976A 1 used, TRN6977A 2 used includes:
	1-80792B93	COVER SUBASSEMBLY includes:
	64-82673L02	COVER
	3-138162	SCREW, tapping: 4-40 x 3/8"; 4 used
	42-84284B01	RETAINER: 4 used
	75-82902K01	PAD (rubber)
	1-80797B35	PANEL ASSEMBLY, filter includes:
	64-82673L03	PANEL
	2-119913	NUT, hex: 8-32 x 11/32 x 1/8" 3 used
	2-82360B07	NUT, speed: TRN6976A 12 used; TRN6977A 16 used
	3-122777	SCREW, machine: 8-32 x 1/2: 3 used
	3-134268	SCREW, tapping: 4-40 x 7/16" 2 used
	3-135038	SCREW, tapping: 1/4-14 x 3/4"; TRN6976A 12 used, TRN6977A 16 used
	3-138162	SCREW, tapping: 4-40 x 3/8" 4 used
	3-139495	SCREW, tapping: 6-20 x 5/16" 2 used
	3-82227A02	SCREW, machine: 4-40 x 7/16"; 4 used
	7-82683K01	BRACKET, filter
	13-813618	DECAL, patent number
	14-82903K01	INSULATOR: 2.68 x 1.25"
	26-82911K01	HEAT SINK
	26-83270L01	SHIELD, Power Control Board
	33-83051K01	NAMEPLATE
	42-10217A02	STRAP, tie: .091 x 3.62"; 10 used
	42-10217A10	STRAP, tie: .184 x 7.78"; 3 used
	42-84284B01	RETAINER, screw: 4 used
	54-842366	LABEL, replacement parts
	54-850440	LABEL, FCC
	54-83040C01	LABEL, audio
	54-84857B01	LABEL, wattmeter
	55-84300B01	HANDLE: 3.52" long; TRN6976A 4 used, TRN6977A 6 used
	55-84300B02	HANDLE: 2.12" long
	66-84387C01	TOOL, universal tuning
	66-84690C01	TOOL, contact removal

TKN6937A Cable Kit, Power PL-5517-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80797B40	LEAD & LUG ASSEMBLY includes:
	29-824151	LUG, slotted tongue: 2 used
	29-10210A10	TERMINAL, crimp: #6 (yellow); 2 used
	30-813233	CABLE, battery: #10 (red) 33" long
	30-831572	CABLE, battery: #10 (black)

DESCRIPTION 68P81017E23
INSTALLATION 68P81015E19
UPRIGHT OUTDOOR CABINET 68P81033E42
"COMPA–STATION" OUTDOOR CABINET 68P81033E46
MAINTENANCE 68P81017E24
ANTENNA SWITCH & MISCELLANEOUS HARDWARE 68P81014E92
FILTERS AND DUPLEXERS 68P81102E85
METERING AND INTERCOM 68P81033E28
STATION HARDWARE KIT 68P81033E23

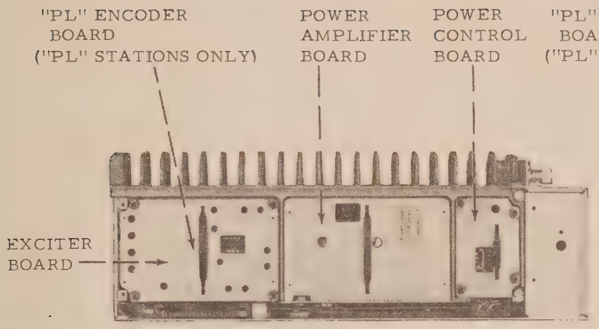
TRANSMITTER INTERCONNECT BOARD 68P81033E78
TRANSMITTER INTRODUCTION 68P81016E64
TRANSMITTER INTERCONNECT UNIT 68P81026E69
EXCITER 68P81026E66
90/100/110 WATT POWER AMPLIFIER 68P81026E67
60 WATT POWER AMPLIFIER 68P81015E12
POWER CONTROL BOARD 68P81015E07
SIMPLEX "DIGITAL PRIVATE–LINE" ENCODER 68P81028E63
DUPLEX "DIGITAL PRIVATE–LINE" ENCODER 68P81028E64
"PRIVATE–LINE" ENCODER 68P81026E71
TRANSMITTER SHIELD UNIT 68P81015E21
TRANSMITTER HARDWARE KITS 68P81016E57
"PRIVATE–LINE" DISABLE CABLE KIT 68P81026E77

RECEIVER INTRODUCTION 68P81026E76
RECEIVER INTERCONNECT BOARD 68P81034E07
RECEIVER INTERCONNECT UNIT 68P81026E72
RECEIVER RF & IF BOARD 68P81015E02
RECEIVER AUDIO & SQUELCH BOARD 68P81025E79
AUDIO POWER AMPLIFIER 68P81014E97
"DIGITAL PRIVATE–LINE" DECODER 68P81028E66
"PRIVATE–LINE" DECODER 68P81026E73
RECEIVER SHIELD UNIT 68P81025E14
RF PREAMPLIFIER & CABLE 68P81016E33
2–RECEIVER COUPLER 68P81016E62
RECEIVER HARDWARE KIT 68P81034E24

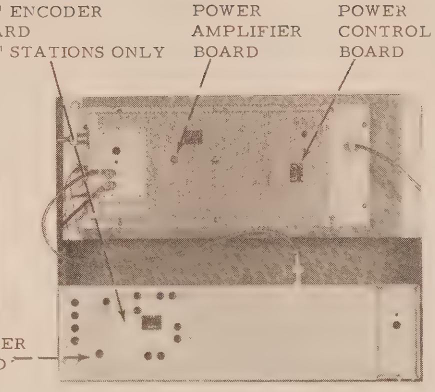
POWER SUPPLY 68P81033E41
POWER SUPPLY 68P81020E44

SCHEMATIC DIAGRAM AND ALIGNMENT PROCEDURE 68P81103E49
RF INTERCABLING SECTION (INTERMITTENT DUTY STATIONS) 68P81016E97
RF INTERCABLING SECTION (CONTINUOUS DUTY STATIONS) 68P81016E98
RF INTERCABLING SECTION (CONTINUOUS DUTY STATION WITH
UNIFIED CONTROL CHASSIS 68P81034E06

TRANSMITTER INTRODUCTION



INTERMITTENT DUTY TRANSMITTER



CONTINUOUS DUTY TRANSMITTER

AEPS-9231-O

Intermittent or continuous duty version transmitters can be used in the Motorola "Micor" "Compa-Station" base and repeater stations. Transmitter model breakdown is shown in the model charts at the end of this section. Intermittent duty versions provide 60-, 90-, or 110-watt capability with a 20% duty cycle (1 minute ON followed by 4 minutes OFF). Continuous duty versions provide 60-, 90-, or 100-watt capability with no OFF time required except as dictated by operating procedure. Intermittent duty stations require less space then continuous duty stations and are mounted in smaller cabinets. Extra space is required in continuous duty stations to provide additional power amplifier heat dissipation capability. The power amplifier/power control boards are mounted separate from the exciter which permits the use of a larger heat sink.

Should the temperature rise excessively in an intermittent duty station, transmitter output power is automatically cut back to keep transistor temperature within the safe operating range. This feature is not required or provided with continuous duty stations.

In intermittent duty stations, a single, integral transmitter assembly occupies one "shelf" of the station. These transmitters consists of exciter, power amplifier, power control board and all necessary associated items. Continuous duty stations use a transmitter that consists of two separate assemblies; the exciter-driver and power amplifier are separate assemblies, each occupying a "shelf" of the station.

Transmitter cabling is detailed in the rf intercabling section at the rear of this manual under station diagrams. Electrical parts list information accompanies the applicable schematic diagram. Transmitter mechanical items are parts listed in the transmitter hardware kits section under the transmitter miscellaneous tabs.

MOTOROLA

MODEL CHART
FOR
INTERMITTENT DUTY
POWER AMPLIFIER
SECOND VERSION

CODE:

☒ = ONE ITEM INCLUDED.

NOTE

THESE POWER AMPLIFIERS ARE PART OF INTERMITTENT DUTY STATION MODELS LISTED IN THE TRANSMITTER MODEL CHART.

MODEL	DESCRIPTION	TLD5952A 100 W POWER AMPLIFIER BOARD (132-150.8 MHz)	TLD5953A 100 W POWER AMPLIFIER BOARD (150.8-162 MHz)	TLD5954A 100 W POWER AMPLIFIER BOARD (162-174 MHz)	TFD6111A EXCITER FILTER (132-150.8 MHz)	TFD6112A EXCITER FILTER (150.8-174 MHz)	TFD6101A HARMONIC FILTER (132-150.8 MHz)	TFD6102A HARMONIC FILTER (150.8-174 MHz)	TLN5605A CHASSIS & HEAT SINK ASSEMBLY, 100 W	TLN5074A TERMINAL BRACKET	TLD8313A 60 W POWER AMPLIFIER BOARD (150.8-162 MHz)	TLD8314A 60 W POWER AMPLIFIER BOARD (162-174 MHz)	TLN4781A CHASSIS & HEAT SINK ASSEMBLY, 60 W	TRN6444A R-C REGEN SUPPRESSOR KIT (60 W)	TRN6445A R-C REGEN SUPPRESSOR KIT (90-110 W, 132-162 MHz)	TLD5502A R-C REGEN SUPPRESSOR KIT (90-110 W, 162-174 MHz)	TRN8069A R-C REGEN SUPPRESSOR KIT (90-110 W)
	90/110 W POWER AMPLIFIER																
TLD1682B	132-150.8 MHz	X			X		X		X	X							X
TLD1683C	150.8-162 MHz		X			X		X	X	X					X		
TLD1684C	162-174 MHz			X		X		X	X	X						X	
	60 W POWER AMPLIFIER																
TLD1673A	150.8-162 MHz					X		X		X	X		X	X			
TLD1674A	162-174 MHz					X		X		X		X	X	X			

MOTOROLA

INTERMITTENT DUTY
POWER AMPLIFIER
MODEL CHART
132-174 MHz

CODE:

☒ = ONE ITEM INCLUDED.

NOTE

THESE POWER AMPLIFIERS ARE PART OF INTERMITTENT DUTY STATION MODELS LISTED IN THE TRANSMITTER MODEL CHART.

MODEL	DESCRIPTION	TLD8302A 100 W POWER AMPLIFIER BOARD (132-150.8 MHz)	TLD5483A 100 W POWER AMPLIFIER BOARD (150.8-162 MHz) FORMERLY TLD8633A	TLD5485A 100 W POWER AMPLIFIER BOARD (162-174 MHz) FORMERLY TLD8634A	TFD6111A EXCITER FILTER (132-150.8 MHz)	TFD6112A EXCITER FILTER (150.8-174 MHz)	TFD6101A HARMONIC FILTER (132-150.8 MHz)	TFD6102A HARMONIC FILTER (150.8-174 MHz)	TLN4728A CHASSIS & HEAT SINK ASSEMBLY, 100 W	TLN5074A TERMINAL BRACKET	TLD8313A 60 W POWER AMPLIFIER BOARD (150.8-162 MHz)	TLD8314A 60 W POWER AMPLIFIER BOARD (162-174 MHz)	TLN4781A CHASSIS & HEAT SINK ASSEMBLY, 60 W	TRN6444A R-C REGEN SUPPRESSOR KIT (60 W)	TRN6445A R-C REGEN SUPPRESSOR KIT (90-110 W, 132-162 MHz)	TLD5502A R-C REGEN SUPPRESSOR KIT (90-110 W, 162-174 MHz)
	90/110 W POWER AMPLIFIER															
TLD1682A	132-150.8 MHz	X			X		X		X	X					X	
TLD1683B	150.8-162 MHz (FORMERLY TLD1683A)		X			X		X	X	X					X	
TLD1684B	162-174 MHz (FORMERLY TLD1684A)			X		X		X	X	X						X
	60 W POWER AMPLIFIER															
TLD1673A	150.8-162 MHz					X		X		X	X		X	X		
TLD1674A	162-174 MHz					X		X		X		X	X	X		

EPS-8817-C

MOTOROLA

MODEL CHART

FOR

CONTINUOUS DUTY

POWER AMPLIFIER

MODEL BREAKDOWN CHART

CODE:

X = ONE INCLUDED

	DESCRIPTION	POWER CONTROL BOARD 90/100/110 W	POWER CONTROL BOARD 60 W	100 W POWER AMPLIFIER BOARD (132-150.8 MHz)	100 W POWER AMPLIFIER BOARD (150.8-162 MHz)	100 W POWER AMPLIFIER BOARD (162-174 MHz)	HARMONIC FILTER (132-150.8 MHz)	HARMONIC FILTER (150.8-174 MHz)	100 W PA HARDWARE	PA CASTING & HARDWARE ASSEMBLY	INPUT BRACKET & CABLE	60 W POWER AMPLIFIER BOARD (150.8-162 MHz)	60 W POWER AMPLIFIER BOARD (162-174 MHz)	60 W PA HARDWARE	RESISTOR-CAPACITOR NETWORK (60 W)	RESISTOR-CAPACITOR NETWORK (90-110 W)	RESISTOR-CAPACITOR NETWORK (110 W)	RESISTOR-CAPACITOR NETWORK (110 W)
	UNIT	TLD5960A	TLD8610A	TLD5952A	TLD5953A	TLD5954A	TFD6101A	TFD6102A	TLN5604A	TLN4780A	TRN8012A	TLD8313A	TLD8314A	TLN4742A	TRN6444A	TRN6445A	TLD5502A	TRN8069A
MODEL	DESCRIPTION																	
TLD1692D	100 W POWER AMPLIFIER (132-150.8 MHz)	X		X			X		X	X	X							X
TLD1693E	100 W POWER AMPLIFIER (150.8-162 MHz)	X			X			X	X	X	X					X		
TLD1694E	100 W POWER AMPLIFIER (162-174 MHz)	X				X		X	X	X	X						X	
TLD1703C	60 W POWER AMPLIFIER (150.8-162 MHz)		X					X		X	X	X		X	X			
TLD1704C	60 W POWER AMPLIFIER (162-174 MHz)		X					X					X	X	X			

EPS-26756-O

MOTOROLA

MODEL CHART
FOR
CONTINUOUS DUTY
POWER AMPLIFIER
MODEL BREAKDOWN CHART

CODE:

☒ = ONE INCLUDED

MODEL	DESCRIPTION	TLD8620A	TLD8610A	TLD8302A	TLD5483A	TLD5484A	TFD6101A	TFD6102A	TLN4741A	TLN4780A	TRN8012A	TLD8313A	TLD8314A	TLN4742A	TRN6444A	TRN6445A	TLD5502A	TRN8069A
UNIT / DESCRIPTION		POWER CONTROL BOARD 90/100/110 W	POWER CONTROL BOARD 60 W	100 W POWER AMPLIFIER BOARD (132-150.8 MHz)	100 W POWER AMPLIFIER BOARD (150.8-162 MHz)	100 W POWER AMPLIFIER BOARD (162-174 MHz)	HARMONIC FILTER (132-150.8 MHz)	HARMONIC FILTER (150.8-174 MHz)	100 W PA HARDWARE	PA CASTING & HARDWARE ASSEMBLY	INPUT BRACKET & CABLE	60 W POWER AMPLIFIER BOARD (150.8-162 MHz)	60 W POWER AMPLIFIER BOARD (162-174 MHz)	60 W PA HARDWARE	RESISTOR-CAPACITOR NETWORK (60 W)	RESISTOR-CAPACITOR NETWORK (90-110 W)	RESISTOR-CAPACITOR NETWORK (110 W)	RESISTOR-CAPACITOR NETWORK (110 W)
TLD1692C	100 W POWER AMPLIFIER (132-150.8 MHz)	X		X			X		X	X	X							X
TLD1693D	100 W POWER AMPLIFIER (150.8-162 MHz)	X			X			X	X	X	X					X		
TLD1694D	100 W POWER AMPLIFIER (162-174 MHz)	X				X		X	X	X	X						X	
TLD1703C	60 W POWER AMPLIFIER (150.8-162 MHz)		X					X		X	X	X		X	X			
TLD1704C	60 W POWER AMPLIFIER (162-174 MHz)		X					X					X	X	X			

EPS-22905-C

MOTOROLA

TRANSMITTER
MODEL CHART
FOR
132-174 MHz
"MICOR" "COMPA-STATION" BASE RADIO
AND REPEATER STATIONS
FOURTH VERSION

CODE:

☒ - ONE INCLUDED

* CONSISTS OF ITEMS LISTED IN THE FOLLOWING INTERMITTENT DUTY POWER AMPLIFIER MODEL CHART.

NOTE

INTERMITTENT DUTY STATIONS INCLUDE A SINGLE TRANSMITTER UNIT. CONTINUOUS DUTY STATIONS INCLUDE SEPARATE EXCITER-DRIVER AND POWER AMPLIFIER UNITS.

	DESCRIPTION	INTERMITTENT DUTY MODELS	90/110 W POWER AMPLIFIER (132-150.8 MHz)	90/110 W POWER AMPLIFIER (150.8-162 MHz)	90/110 W POWER AMPLIFIER (162-174 MHz)	60 W POWER AMPLIFIER (150.8-162 MHz)	60 W POWER AMPLIFIER (162-174 MHz)	TRANSMITTER INTERCONNECT BOARD	TRANSMITTER RF CABLE ASSEMBLY	TRANSMITTER HARDWARE	INTERMITTENT & CONTINUOUS DUTY MODELS	EXCITER BOARD (132-150.8 MHz)	EXCITER BOARD (150.8-174 MHz)	POWER CONTROL BOARD 90/100/110 W	POWER CONTROL BOARD 60 W	CONTINUOUS DUTY MODELS	EXCITER FILTER (132-150.8)	EXCITER FILTER (150.8-174)	TRANSMITTER INTERCONNECT BOARD	EXCITER CHASSIS & HARDWARE ASSEMBLY	EXCITER RF CABLE	100 W POWER AMPLIFIER BOARD (132-150.8 MHz)	100 W POWER AMPLIFIER BOARD (150.8-162 MHz)	100 W POWER AMPLIFIER BOARD (162-174 MHz)	HARMONIC FILTER (132-150.8 MHz)	HARMONIC FILTER (150.8-174 MHz)	100 W PA HARDWARE	PA CASTING & HARDWARE ASSEMBLY	60 W POWER AMPLIFIER BOARD (150.8-162 MHz)	60 W POWER AMPLIFIER BOARD (162-174 MHz)	60 W PA HARDWARE	R-C REGEN SUPPRESSOR KIT (110 W, 132-162 MHz)	R-C REGEN SUPPRESSOR KIT (110 W, 162-174 MHz)	R-C REGEN SUPPRESSOR KIT (60 W)	POWER CONTROL BOARD 110 W 132-174 MHz	INPUT BRACKET AND CABLE ASSEMBLY	R-C REGEN SUPPRESSOR KIT (90-110 W)
	UNIT		*TLD1682B	*TLD1683C	*TLD1684C	*TLD1673A	*TLD1674A	TLN4729B	TKN6569A	TLN4730A		TLD5321A	TLD5322A	TLD8620A	TLD8610A		TFD6111A	TFD6112A	TLN4743B	TLN4744A	TKN6581A	TLD5952A	TLD5953A	TLD5954A	TFD6101A	TFD6102A	TLN5604A	TLN4780A	TLD8313A	TLD8314A	TLN4742A	TRN6445A	TLD5502A	TRN6444A	TLD5960A	TRN8012A	TRN8069A
MODEL	DESCRIPTION																																				
	INTERMITTENT DUTY MODELS																																				
TTD1692CA	90/110 W TRANSMITTER (132-150.8 MHz)		X					X	X	X		X		X																							
TTD1693DA	90/110 W TRANSMITTER (150.8-162 MHz)			X				X	X	X			X	X																							
TTD1694DA	90/110 W TRANSMITTER (162-174 MHz				X			X	X	X			X	X																							
TTD1703BA	60 W TRANSMITTER (150.8-162 MHz)					X		X	X	X			X		X																						
TTD1704BA	60 W TRANSMITTER (162-174 MHz)						X	X	X	X			X		X																						
	CONTINUOUS DUTY MODELS																																				
TLD1711B	EXCITER-DRIVER (132-150.8 MHz)											X					X		X	X	X																
TLD1712B	EXCITER-DRIVER (150.8-174 MHz)												X					X	X	X	X																
TLD1692D	100 W POWER AMPLIFIER (132-150.8 MHz)																					X			X		X	X							X	X	X
TLD1693E	100 W POWER AMPLIFIER (150.8-162 MHz)																						X			X	X	X				X			X	X	
TLD1694E	100 W POWER AMPLIFIER (162-174 MHz)																							X		X	X	X					X		X	X	
TLD1703C	60 W POWER AMPLIFIER (150.8-162 MHz)														X											X		X	X		X			X		X	
TLD1704C	60 W POWER AMPLIFIER (162-174 MHz)														X											X		X		X	X			X		X	

																															CONTINUOUS DUTY MODELS
																						X								TFD6111A	EXCITER FILTER (132-150.8)
																					X									TFD6112A	EXCITER FILTER (150.8-174)
																					X	X								TLN4743B	TRANSMITTER INTERCONNECT BOARD
																					X	X								TLN4744A	EXCITER CHASSIS & HARDWARE ASSEMBLY
																					X	X								TKN6581A	EXCITER RF CABLE
																				X										TLD8302A	100 W POWER AMPLIFIER BOARD (132-150.8 MHz)
																			X											TLD5483A	100 W POWER AMPLIFIER BOARD (150.8-162 MHz)
																		X												TLD5484A	100 W POWER AMPLIFIER BOARD (162-174 MHz)
																				X										TFD6101A	HARMONIC FILTER (132-150.8 MHz)
																X	X	X	X											TFD6102A	HARMONIC FILTER (150.8-174 MHz)
																		X	X	X										TLN4741A	100 W PA HARDWARE
																X	X	X	X	X										TLN4780A	PA CASTING & HARDWARE ASSEMBLY
																X	X	X	X	X										TLN5922A	INPUT BRACKET & CABLE
																	X													TLD8313A	60 W POWER AMPLIFIER BOARD (150.8-162 MHz)
																X														TLD8314A	60 W POWER AMPLIFIER BOARD (162-174 MHz)
																														TLN4742A	60 W PA HARDWARE
																			X	X										TRN6445A	R-C REGEN SUPPRESSOR KIT (110 W, 132-162 MHz)
																		X												TLD5502A	R-C REGEN SUPPRESSOR KIT (110 W, 162-174 MHz)
																X	X													TRN6444A	R-C REGEN SUPPRESSOR KIT (60 W)

MOTOROLA

TRANSMITTER
MODEL CHART
FOR
132-174 MHz
"MICOR" "COMPA-STATION" BASE RADIO
AND REPEATER STATIONS
FOURTH VERSION

CODE:

☒ = ONE INCLUDED

* CONSISTS OF ITEMS LISTED IN THE FOLLOWING INTERMITTENT DUTY POWER AMPLIFIER MODEL CHART.

NOTE

INTERMITTENT DUTY STATIONS INCLUDE A SINGLE TRANSMITTER UNIT. CONTINUOUS DUTY STATIONS INCLUDE SEPARATE EXCITER-DRIVER AND POWER AMPLIFIER UNITS.

MODEL	DESCRIPTION	INTERMITTENT DUTY MODELS: 90/110 W POWER AMPLIFIER (132-150.8 MHz)	90/110 W POWER AMPLIFIER (150.8-162 MHz)	90/110 W POWER AMPLIFIER (162-174 MHz)	60 W POWER AMPLIFIER (150.8-162 MHz)	60 W POWER AMPLIFIER (162-174 MHz)	TRANSMITTER INTERCONNECT BOARD	TRANSMITTER RF CABLE ASSEMBLY	TRANSMITTER HARDWARE
	UNIT	*TLD1682B	*TLD1683C	*TLD1684C	*TLD1673A	*TLD1674A	TLN4729B	TKN6569A	TLN4730A
	INTERMITTENT DUTY MODELS								
TTD1692CA	90/110 W TRANSMITTER (132-150.8 MHz)	X					X	X	X
TTD1693DA	90/110 W TRANSMITTER (150.8-162 MHz)		X				X	X	X
TTD1694DA	90 110 W TRANSMITTER (162-174 MHz			X			X	X	X
TTD1703BA	60 W TRANSMITTER (150.8-162 MHz)				X		X	X	X
TTD1704BA	60 W TRANSMITTER (162-174 MHz)					X	X	X	X
	CONTINUOUS DUTY MODELS								
TLD1711B	EXCITER-DRIVER (132-150.8 MHz)								
TLD1712B	EXCITER-DRIVER (150.8-174 MHz)								
TLD1692D	100 W POWER AMPLIFIER (132-150.8 MHz)								
TLD1693E	100 W POWER AMPLIFIER (150.8-162 MHz)								
TLD1694E	100 W POWER AMPLIFIER (162-174 MHz)								
TLD1703C	60 W POWER AMPLIFIER (150.8-162 MHz)								
TLD1704C	60 W POWER AMPLIFIER (162-174 MHz)								

MODEL	INTERMITTENT & CONTINUOUS DUTY MODELS: EXCITER BOARD (132-150.8 MHz)	EXCITER BOARD (150.8-174 MHz)	POWER CONTROL BOARD 90/100/110 W	POWER CONTROL BOARD 60 W
UNIT	TLD5321A	TLD5322A	TLD8620A	TLD8610A
INTERMITTENT DUTY MODELS				
TTD1692CA	X		X	
TTD1693DA		X	X	
TTD1694DA		X	X	
TTD1703BA		X		X
TTD1704BA		X		X
CONTINUOUS DUTY MODELS				
TLD1711B	X			
TLD1712B		X		
TLD1692D				
TLD1693E				
TLD1694E				
TLD1703C				X
TLD1704C				X

MODEL	CONTINUOUS DUTY MODELS: EXCITER FILTER (132-150.8)	EXCITER FILTER (150.8-174)	TRANSMITTER INTERCONNECT BOARD	EXCITER CHASSIS & HARDWARE ASSEMBLY	EXCITER RF CABLE	100 W POWER AMPLIFIER BOARD (132-150.8 MHz)	100 W POWER AMPLIFIER BOARD (150.8-162 MHz)	100 W POWER AMPLIFIER BOARD (162-174 MHz)	HARMONIC FILTER (132-150.8 MHz)	HARMONIC FILTER (150.8-174 MHz)	100 W PA HARDWARE	PA CASTING & HARDWARE ASSEMBLY
UNIT	TFD6111A	TFD6112A	TLN4743B	TLN4744A	TKN6581A	TLD5952A	TLD5953A	TLD5954A	TFD6101A	TFD6102A	TLN5604A	TLN4780A
INTERMITTENT DUTY MODELS												
TTD1692CA												
TTD1693DA												
TTD1694DA												
TTD1703BA												
TTD1704BA												
CONTINUOUS DUTY MODELS												
TLD1711B	X		X	X	X							
TLD1712B		X	X	X	X							
TLD1692D						X			X		X	X
TLD1693E							X			X	X	X
TLD1694E								X		X	X	X
TLD1703C										X		X
TLD1704C										X		X

MODEL	60 W POWER AMPLIFIER BOARD (150.8-162 MHz)	60 W POWER AMPLIFIER BOARD (162-174 MHz)	60 W PA HARDWARE	R-C REGEN SUPPRESSOR KIT (110 W, 132-162 MHz)	R-C REGEN SUPPRESSOR KIT (110 W, 162-174 MHz)	R-C REGEN SUPPRESSOR KIT (60 W)	POWER CONTROL BOARD 110 W 132-174 MHz	INPUT BRACKET AND CABLE ASSEMBLY	R-C REGEN SUPPRESSOR KIT (90-110 W)
UNIT	TLD8313A	TLD8314A	TLN4742A	TRN6445A	TLD5502A	TRN6444A	TLD5960A	TRN8012A	TRN8069A
INTERMITTENT DUTY MODELS									
TTD1692CA									
TTD1693DA									
TTD1694DA									
TTD1703BA									
TTD1704BA									
CONTINUOUS DUTY MODELS									
TLD1711B									
TLD1712B									
TLD1692D							X	X	X
TLD1693E				X			X	X	
TLD1694E					X		X	X	
TLD1703C	X		X			X		X	
TLD1704C		X	X			X		X	

MOTOROLA

TRANSMITTER
MODEL CHART
FOR
132-174 MHz
"MICOR" "COMPA-STATION" BASE RADIO
AND REPEATER STATIONS

THIRD VERSION

CODE:

☒ = ONE INCLUDED

* = CONSISTS OF ITEMS LISTED IN THE FOLLOWING INTERMITTENT DUTY POWER AMPLIFIER MODEL CHART.

NOTE

INTERMITTENT DUTY STATIONS INCLUDE A SINGLE TRANSMITTER UNIT. CONTINUOUS DUTY STATIONS INCLUDE SEPARATE EXCITER-DRIVER AND POWER AMPLIFIER UNITS.

	DESCRIPTION	INTERMITTENT DUTY MODELS	90/110 W POWER AMPLIFIER (132-150.8 MHz)	90/110 W POWER AMPLIFIER (150.8-162 MHz)	90/110 W POWER AMPLIFIER (162-174 MHz)	60 W POWER AMPLIFIER (150.8-162 MHz)	60 W POWER AMPLIFIER (162-174 MHz)	TRANSMITTER INTERCONNECT BOARD	TRANSMITTER RF CABLE ASSEMBLY	TRANSMITTER HARDWARE	INTERMITTENT & CONTINUOUS DUTY MODELS	EXCITER BOARD (132-150.8 MHz)	EXCITER BOARD (150.8-174 MHz)	POWER CONTROL BOARD 90/100/110 W	POWER CONTROL BOARD 60 W	CONTINUOUS DUTY MODELS	EXCITER FILTER (132-150.8)	EXCITER FILTER (150.8-174)	TRANSMITTER INTERCONNECT BOARD	EXCITER CHASSIS & HARDWARE ASSEMBLY	EXCITER RF CABLE	100 W POWER AMPLIFIER BOARD (132-150.8 MHz)	100 W POWER AMPLIFIER BOARD (150.8-162 MHz)	100 W POWER AMPLIFIER BOARD (162-174 MHz)	HARMONIC FILTER (132-150.8 MHz)	HARMONIC FILTER (150.8-174 MHz)	100 W PA HARDWARE	PA CASTING & HARDWARE ASSEMBLY	INPUT BRACKET & CABLE	60 W POWER AMPLIFIER BOARD (150.8-162 MHz)	60 W POWER AMPLIFIER BOARD (162-174 MHz)	60 W PA HARDWARE	R-C REGEN SUPPRESSOR KIT (110 W, 132-162 MHz)	R-C REGEN SUPPRESSOR KIT (110 W, 162-174 MHz)	R-C REGEN SUPPRESSOR KIT (60 W)
	UNIT		*TLD1682A	*TLD1683B	*TLD1684B	*TLD1673A	*TLD1674A	TLN4729B	TKN6569A	TLN4730A		TLD5321A	TLD4322A	TLD8620A	TLD8610A		TFD6111A	TFD6112A	TLN4743B	TLN4744A	TKN6581A	TLD8302A	TLD5483A	TLD5484A	TFD6101A	TFD6102A	TLN4741A	TLN4780A	TLN5922A	TLD8313A	TLD8314A	TLN4742A	TRN6445A	TLD5502A	TRN6444A
MODEL	DESCRIPTION																																		
	INTERMITTENT DUTY MODELS																																		
TTD1692BA	90/110 W TRANSMITTER (132-150.8 MHz)		X					X	X	X		X	X	X																					
TTD1693CA	90/110 W TRANSMITTER (150.8-162 MHz)			X				X	X	X			X	X																					
TTD1694CA	90/110 W TRANSMITTER (162-174 MHz				X			X	X	X			X	X																					
TTD1703BA	60 W TRANSMITTER (150.8-162 MHz)					X		X	X	X			X		X																				
TTD1704BA	60 W TRANSMITTER (162-174 MHz)						X	X	X	X			X		X																				
	CONTINUOUS DUTY MODELS																																		
TLD1711B	EXCITER-DRIVER (132-150.8 MHz)											X					X		X	X	X														
TLD1712B	EXCITER-DRIVER (150.8-174 MHz)												X					X	X	X	X														
TLD1692B	100 W POWER AMPLIFIER (132-150.8 MHz)													X								X			X		X	X	X				X		
TLD1693C	100 W POWER AMPLIFIER (150.8-162 MHz)													X									X			X	X	X	X				X		
TLD1694C	100 W POWER AMPLIFIER (162-174 MHz)													X										X		X	X	X	X					X	
TLD1703B	60 W POWER AMPLIFIER (150.8-162 MHz)														X											X		X	X	X					X
TLD1704B	60 W POWER AMPLIFIER (162-174 MHz)														X											X		X	X		X				X

																															CONTINUOUS DUTY MODELS
																		X												TFD6111A	EXCITER FILTER (132-150.8)
																	X													TFD6112A	EXCITER FILTER (150.8-174)
																	X	X												TLN4743B	TRANSMITTER INTERCONNECT BOARD
																	X	X												TLN4744A	EXCITER CHASSIS & HARDWARE ASSEMBLY
																	X	X												TKN6581A	EXCITER RF CABLE
																X														TLD8302A	100W POWER AMPLIFIER BOARD (132-150.8 MHz)
															X															TLD5483A	100W POWER AMPLIFIER BOARD (150.8-162 MHz) FORMERLY TLD8633A
														X																TLD5484A	100W POWER AMPLIFIER BOARD (162-174 MHz) FORMERLY TLD8624A
																X														TFD6101A	HARMONIC FILTER (132-150.8 MHz)
												X	X	X	X															TFD6102A	HARMONIC FILTER (150.8-174 MHz)
														X	X	X														TLN4741A	100W PA HARDWARE
												X	X	X	X	X														TLN4780A	PA CASTING & HARDWARE ASSEMBLY
												X	X	X	X	X														TLN4822A	INPUT BRACKET & CABLE
													X																	TLD8313A	60W POWER AMPLIFIER BOARD (150.8-162 MHz)
												X																		TLD8314A	60W POWER AMPLIFIER BOARD (162-174 MHz)
												X	X																	TLN4742A	60W PA HARDWARE
														X																TLD5502A	R-C REGEN SUPPRESSOR KIT (10 W, 162-174 MHz)
												X	X																	TLD6444A	R-C REGEN SUPPRESSOR KIT (60 W)
															X															TLD6445A	R-C REGEN SUPPRESSOR KIT (110 W, 132-162 MHz)

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																															CONTINUOUS DUTY MODELS
																			X											TFD6111A	EXCITER FILTER (132-150.8)
																		X												TFD6112A	EXCITER FILTER (150.8-174)
																		X	X											TLN4743A	TRANSMITTER INTERCONNECT BOARD
																		X	X											TLN4744A	EXCITER CHASSIS & HARDWARE ASSEMBLY
																		X	X											TKN6581A	EXCITER RF CABLE
																	X													TLD8302A	100W POWER AMPLIFIER BOARD (132-150.8 MHz)
																X														TLD8633A	100W POWER AMPLIFIER BOARD (150.8-162 MHz)
															X															TLD8634A	100W POWER AMPLIFIER BOARD (162-174 MHz)
																	X													TFD6101A	HARMONIC FILTER (132-150.8 MHz)
													X	X	X	X														TFD6102A	HARMONIC FILTER (150.8-174 MHz)
															X	X	X													TLN4741A	100W PA HARDWARE
													X	X	X	X	X													TLN4780A	PA CASTING & HARDWARE ASSEMBLY
													X	X	X	X	X													TLN4822A	INPUT BRACKET & CABLE
														X																TLD8313A	60W POWER AMPLIFIER BOARD (150.8-162 MHz)
													X																	TLD8314A	60W POWER AMPLIFIER BOARD (162-174 MHz)
																														TLN4742A	60W PA HARDWARE

MOTOROLA

TRANSMITTER
MODEL CHART
FOR
132-174 MHz
"MICOR" "COMPA-STATION" BASE RADIO
AND REPEATER STATIONS

SECOND VERSION

CODE:

☒ = ONE INCLUDED

* = CONSISTS OF ITEMS LISTED IN THE FOLLOWING INTERMITTENT DUTY POWER AMPLIFIER MODEL CHART.

NOTE

INTERMITTENT DUTY STATIONS INCLUDE A SINGLE TRANSMITTER UNIT. CONTINUOUS DUTY STATIONS INCLUDE SEPARATE EXCITER-DRIVER AND POWER AMPLIFIER UNITS.

MODEL	DESCRIPTION	*TLD1682A 90/110W POWER AMPLIFIER (132-150.8 MHz)	*TLD1683A 90/110W POWER AMPLIFIER (150.8-162 MHz)	*TLD1684A 90/110W POWER AMPLIFIER (162-174 MHz)	*TLD1673A 60W POWER AMPLIFIER (150.8-162 MHz)	*TLD1674A 60W POWER AMPLIFIER (162-174 MHz)	TLN4729B TRANSMITTER INTERCONNECT BOARD	TKN6569A TRANSMITTER RF CABLE ASSEMBLY	TLN4730A TRANSMITTER HARDWARE	TLD5321A EXCITER BOARD (132-150.8 MHz)	TLD5322A EXCITER BOARD (150.8-174 MHz)	TLD8620A POWER CONTROL BOARD 90/100/110W	TLD8610A POWER CONTROL BOARD 60W
		INTERMITTENT DUTY MODELS								INTERMITTENT & CONTINUOUS DUTY MODELS			
	INTERMITTENT DUTY MODELS												
TTD1692BA	90/110W TRANSMITTER (132-150.8 MHz)	☒					☒	☒	☒	☒	☒	☒	
TTD1693BA	90/110W TRANSMITTER (150.8-162 MHz)		☒				☒	☒	☒		☒	☒	
TTD1694BA	90/110W TRANSMITTER (162-174 MHz)			☒			☒	☒	☒		☒	☒	
TTD1703BA	60W TRANSMITTER (150.8-162 MHz)				☒		☒	☒	☒		☒		☒
TTD1704BA	60W TRANSMITTER (162-174 MHz)					☒	☒	☒	☒		☒		☒
	CONTINUOUS DUTY MODELS												
TLD1711B	EXCITER-DRIVER (132-150.8 MHz)									☒			
TLD1712B	EXCITER-DRIVER (150.8-174 MHz)										☒		
TLD1692A	100W POWER AMPLIFIER (132-150.8 MHz)											☒	
TLD1693B	100W POWER AMPLIFIER (150.8-162 MHz) FORMERLY TLD1693A											☒	
TLD1694B	100W POWER AMPLIFIER (162-174 MHz) FORMERLY TLD1694A											☒	
TLD1703A	60W POWER AMPLIFIER (150.8-162 MHz)												☒
TLD1704A	60W POWER AMPLIFIER (162-174 MHz)												☒

MODEL	DESCRIPTION	TFD6111A EXCITER FILTER (132-150.8)	TFD6112A EXCITER FILTER (150.8-174)	TLN4743B TRANSMITTER INTERCONNECT BOARD	TLN4744A EXCITER CHASSIS & HARDWARE ASSEMBLY	TKN6581A EXCITER RF CABLE	TLD8302A 100W POWER AMPLIFIER BOARD (132-150.8 MHz)	TLD5483A 100W POWER AMPLIFIER BOARD (150.8-162 MHz) FORMERLY TLD8633A	TLD5484A 100W POWER AMPLIFIER BOARD (162-174 MHz) FORMERLY TLD8634A	TFD6101A HARMONIC FILTER (132-150.8 MHz)	TFD6102A HARMONIC FILTER (150.8-174 MHz)	TLN4741A 100W PA HARDWARE	TLN4780A PA CASTING & HARDWARE ASSEMBLY	TLN4822A INPUT BRACKET & CABLE	TLD8313A 60W POWER AMPLIFIER BOARD (150.8-162 MHz)	TLD8314A 60W POWER AMPLIFIER BOARD (162-174 MHz)	TLN4742A 60W PA HARDWARE	TLD5502A R-C REGEN SUPPRESSOR KIT (10 W, 162-174 MHz)	TLD6444A R-C REGEN SUPPRESSOR KIT (60 W)	TLD6445A R-C REGEN SUPPRESSOR KIT (110 W, 132-162 MHz)
		CONTINUOUS DUTY MODELS																		
	INTERMITTENT DUTY MODELS																			
TTD1692BA	90/110W TRANSMITTER (132-150.8 MHz)																			
TTD1693BA	90/110W TRANSMITTER (150.8-162 MHz)																			
TTD1694BA	90/110W TRANSMITTER (162-174 MHz)																			
TTD1703BA	60W TRANSMITTER (150.8-162 MHz)																			
TTD1704BA	60W TRANSMITTER (162-174 MHz)																			
	CONTINUOUS DUTY MODELS																			
TLD1711B	EXCITER-DRIVER (132-150.8 MHz)	☒		☒	☒	☒														
TLD1712B	EXCITER-DRIVER (150.8-174 MHz)		☒	☒	☒	☒														
TLD1692A	100W POWER AMPLIFIER (132-150.8 MHz)						☒			☒		☒	☒	☒						
TLD1693B	100W POWER AMPLIFIER (150.8-162 MHz) FORMERLY TLD1693A							☒			☒	☒	☒	☒						☒
TLD1694B	100W POWER AMPLIFIER (162-174 MHz) FORMERLY TLD1694A								☒		☒	☒	☒	☒				☒		
TLD1703A	60W POWER AMPLIFIER (150.8-162 MHz)										☒		☒	☒	☒		☒		☒	
TLD1704A	60W POWER AMPLIFIER (162-174 MHz)										☒		☒	☒		☒	☒		☒	

EPS-16885-C

MOTOROLA

TRANSMITTER
MODEL CHART
FOR
132-174 MHz
"MICOR" "COMPA-STATION" BASE RADIO
AND REPEATER STATIONS

ORIGNAL VERSION

CODE:

☒ = ONE INCLUDED

* = CONSISTS OF ITEMS LISTED IN THE INTERMITTENT DUTY POWER AMPLIFIER MODEL CHART.

NOTE

INTERMITTENT DUTY STATIONS INCLUDE A SINGLE TRANSMITTER UNIT. CONTINUOUS DUTY STATIONS INCLUDE SEPARATE EXCITER-DRIVER AND POWER AMPLIFIER UNITS.

MODEL	DESCRIPTION	*TLD1682A INTERMITTENT DUTY MODELS 90/110W POWER AMPLIFIER (132-150.8 MHz)	*TLD1683A 90/110W POWER AMPLIFIER (150.8-162 MHz)	*TLD1684A 90/110W POWER AMPLIFIER (162-174 MHz)	*TLD1673A 60W POWER AMPLIFIER (150.8-162 MHz)	*TLD1674A 60W POWER AMPLIFIER (162-174 MHz)	TLN4729A TRANSMITTER INTERCONNECT BOARD	TKN6569A TRANSMITTER RF CABLE ASSEMBLY	TLN4730A TRANSMITTER HARDWARE	TLD8731A INTERMITTENT & CONTINUOUS DUTY MODELS EXCITER BOARD (132-150.8 MHz)	TLD8732A EXCITER BOARD (150.8-174 MHz)	TLD8620A POWER CONTROL BOARD 90/100/110W	TLD8610A POWER CONTROL BOARD 60W
	INTERMITTENT DUTY MODELS												
TTD1692AA	90/110W TRANSMITTER (132-150.8 MHz)	☒					☒	☒	☒	☒	☒	☒	
TTD1693AA	90/110W TRANSMITTER (150.8-162 MHz)		☒				☒	☒	☒		☒	☒	
TTD1694AA	90/110W TRANSMITTER (162-174 MHz)			☒			☒	☒	☒		☒	☒	
TTD1703AA	60W TRANSMITTER (150.8-162 MHz)				☒		☒	☒	☒		☒		☒
TTD1704AA	60W TRANSMITTER (162-174 MHz)					☒	☒	☒	☒		☒		☒
	CONTINUOUS DUTY MODELS												
TLD1711A	EXCITER-DRIVER (132-150.8 MHz)									☒			
TLD1712A	EXCITER-DRIVER (150.8-174 MHz)										☒		
TLD1692A	100W POWER AMPLIFIER (132-150.8 MHz)											☒	
TLD1693A	100W POWER AMPLIFIER (150.8-162 MHz)											☒	
TLD1694A	100W POWER AMPLIFIER (162-174 MHz)											☒	
TLD1703A	60W POWER AMPLIFIER (150.8-162 MHz)												☒
TLD1704A	60W POWER AMPLIFIER (162-174 MHz)												☒

MODEL	DESCRIPTION	TFD6111A CONTINUOUS DUTY MODELS EXCITER FILTER (132-150.8)	TFD6112A EXCITER FILTER (150.8-174)	TLN4743A TRANSMITTER INTERCONNECT BOARD	TLN4744A EXCITER CHASSIS & HARDWARE ASSEMBLY	TKN6581A EXCITER RF CABLE	TLD8302A 100W POWER AMPLIFIER BOARD (132-150.8 MHz)	TLD8633A 100W POWER AMPLIFIER BOARD (150.8-162 MHz)	TLD8634A 100W POWER AMPLIFIER BOARD (162-174 MHz)	TFD6101A HARMONIC FILTER (132-150.8 MHz)	TFD6102A HARMONIC FILTER (150.8-174 MHz)	TLN4741A 100W PA HARDWARE	TLN4780A PA CASTING & HARDWARE ASSEMBLY	TLN4822A INPUT BRACKET & CABLE	TLD8313A 60W POWER AMPLIFIER BOARD (150.8-162 MHz)	TLD8314A 60W POWER AMPLIFIER BOARD (162-174 MHz)	TLN4742A 60W PA HARDWARE
	INTERMITTENT DUTY MODELS																
TTD1692AA	90/110W TRANSMITTER (132-150.8 MHz)																
TTD1693AA	90/110W TRANSMITTER (150.8-162 MHz)																
TTD1694AA	90/110W TRANSMITTER (162-174 MHz)																
TTD1703AA	60W TRANSMITTER (150.8-162 MHz)																
TTD1704AA	60W TRANSMITTER (162-174 MHz)																
	CONTINUOUS DUTY MODELS																
TLD1711A	EXCITER-DRIVER (132-150.8 MHz)	☒		☒	☒	☒											
TLD1712A	EXCITER-DRIVER (150.8-174 MHz)		☒	☒	☒	☒											
TLD1692A	100W POWER AMPLIFIER (132-150.8 MHz)						☒			☒		☒	☒	☒			
TLD1693A	100W POWER AMPLIFIER (150.8-162 MHz)							☒			☒	☒	☒	☒			
TLD1694A	100W POWER AMPLIFIER (162-174 MHz)								☒		☒	☒	☒	☒			
TLD1703A	60W POWER AMPLIFIER (150.8-162 MHz)										☒		☒	☒	☒		
TLD1704A	60W POWER AMPLIFIER (162-174 MHz)										☒		☒	☒		☒	

PARTS LIS

Transmitter Inte
TLN5893A (Base
TLN5894A (Repe
TLN5895A (Full

This parts list c Interconnect Boa number of the ap Column.

REFERENCE SYMBOL	
C1, 2, 3	
C4 thru 8	2
C9, 10, 11	2
C12 thru 16	2
C17, 18	2
C19	2
C20, 21	2
C22, 23, 24	2
C25	2
C26, 27, 28	
C29 thru 33	2
C34, 35, 36	2
C37 thru 41	2
C42, 43	2
C44	2
C45, 46	2
C47, 48, 49	2
C50	2
C901	2
C902, 903, 904	2
C905, 906	2
C907	2
C908	2
C909	2
C910	2
C911thru 916	
C917, 918, 919	2
J1000	2
J1001, 1002, 1003	
J1004	2
L1, 2, 3	
L4, 5, 6	2
L7, 8	2
L9, 10, 11	2
L12	2
L13, 14	2
L15	2
L16	2
L17, 18	2
L19, 20	2
L21	2
L22	2
L23, 24	2
L25	2
L901	2
L902, 903, 904	2
L905, 906, 907	2
L908	2
L909	2
R901	
R902	6
R903, 904 905	6

TRANSMITTER INTERCONNECT BOARD

MODEL TLN5894A (RPTR)
MODEL TLN5893A (BASE)
MODEL TLN5895A (FULL FILTERING OPTION)

FUNCTION -

--Interconnects most transmitter circuit boards to each other (except PA).

--Routes control functions from the unified chassis interconnect board to the transmitter.

--Repeater version includes unique transmitter filtering components.

--Includes partial control stage circuitry used to govern PA power output

--Includes current limiter stage (base stations only) which is electrically functional with antenna network.

PARTS LIST

[illegible] Interconnect Board
[illegible] Base Station
[illegible] Repeater Station
[illegible] Filtering Option)

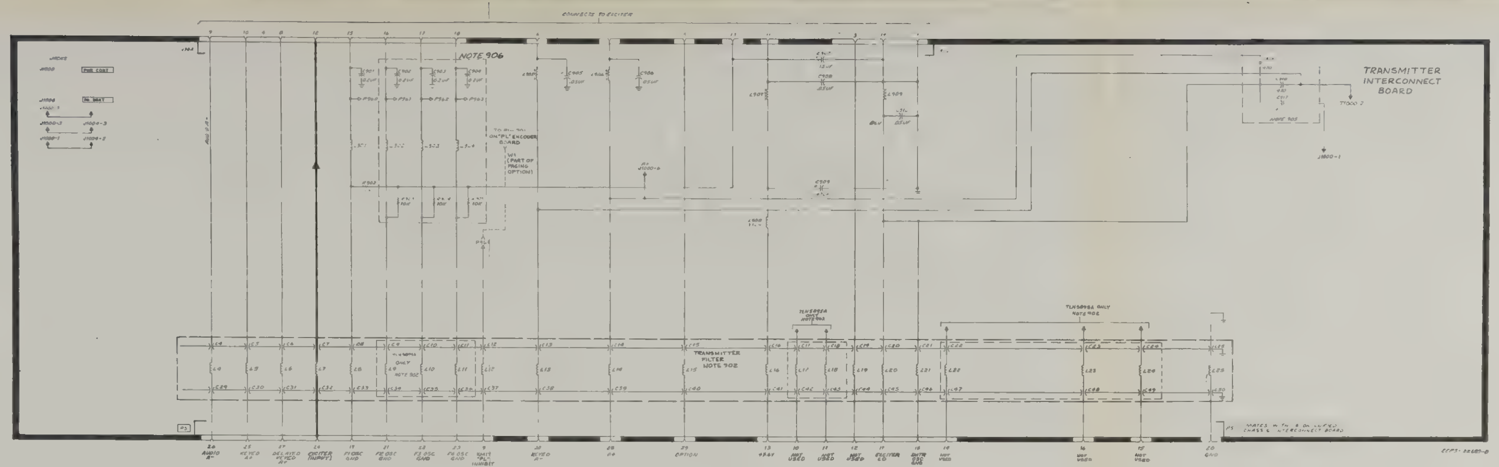
NOTE

[illegible] covers three models of the Transmitter [illegible] Board. Where differences exist, the model [illegible] applicable unit is given in the Description.

PL-5087-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITOR, fixed: pF +100-0%; 50 V: unless otherwise stated
[illegible]		NOT USED
[illegible]	21-[illegible]1219	1000 (TLN5894A & TLN5895A)
[illegible]	21-[illegible]1219	1000 (TLN5895A)
[illegible]	21-[illegible]1219	1000 (TLN5894A & TLN5895A)
[illegible]	21-[illegible]1219	1000 (TLN5895A)
[illegible]	21-[illegible]12H01	100 (TLN5894A & TLN5895A)
[illegible]	21-[illegible]1219	1000 (TLN5894A & TLN5895A)
[illegible]	21-[illegible]1219	100 (TLN5895A)
[illegible]	21-[illegible]1219	1000 (TLN5894A & TLN5895A)
[illegible]		NOT USED
[illegible]	21-[illegible]1219	1000 (TLN5894A & TLN5895A)
[illegible]	21-[illegible]1219	1000 (TLN5895A)
[illegible]	21-[illegible]1219	1000 (TLN5894A & TLN5895A)
[illegible]	21-[illegible]1219	1000 (TLN5895A)
[illegible]	21-[illegible]12H01	100 (TLN5894A & TLN5895A)
[illegible]	21-[illegible]1219	1000 (TLN5894A & TLN5895A)
[illegible]	21-[illegible]1219	1000 (TLN5895A)
[illegible]	21-[illegible]1219	1000 (TLN5894A & TLN5895A)
[illegible]	[illegible]	.2 uF +80-20%; 25 V
[illegible]	21-[illegible]	0.2 uF +80-20%; 25 V (TLN5894A & TLN5895A)
[illegible]	21-[illegible]2C04	.05 uF +80-20%; 25 V
[illegible]	23-[illegible]214C02	15 uF ±20%; 25 V
[illegible]	21-[illegible]2C04	.05 uF +80-20%; 25 V
[illegible]	21-[illegible]B31	47 uF ±20%; 25 V
[illegible]	21-[illegible]2C04	.05 uF +80-20%; 25 V
[illegible]		NOT USED
[illegible]	21-82187B07	470 pF ±10%: 500 V
		CONNECTOR
[illegible]	[illegible]-83441F[illegible]	male, 6-contact (white)
[illegible]		NOT USED
[illegible]	[illegible]-83441F06	male: 6-contact (red)
		COIL, rf
[illegible]		NOT USED
[illegible]	24-83977B01	1-1/2 turns (TLN5894A & TLN5895A)
[illegible]	24-83961B01	3 turns (TLN5894A & TLN5895A)
[illegible]	24-83961B01	3 turns (TLN5895A)
[illegible]	24-83961B01	3 turns (TLN5894A & TLN5895A)
[illegible]	24-83977B01	1-1/2 turns (TLN5894A & TLN5895A)
[illegible]	24-83961B01	3 turns (TLN5894A & TLN5895A)
[illegible]	24-83977B01	1-1/2 turns (TLN5894A & TLN5895A)
[illegible]	24-83961B01	3 turns (TLN5895A)
[illegible]	24-83977B01	1-1/2 turns (TLN5894A & TLN5895A)
[illegible]	24-83961B01	3 turns (TLN5894A & TLN5895A)
[illegible]	24-83977B01	1-1/2 turns (TLN5895A)
[illegible]	24-83961B01	3 turns (TLN5895A)
[illegible]	24-83977B01	1-1/2 turns (TLN5894A & TLN5895A)
[illegible]	24-83900A01	1.62 uH
[illegible]	24-83900A01	1.62 uH (TLN5894A & TLN5895A)
[illegible]	24-83961B01	3 turns
[illegible]	24-854314	33 uH
[illegible]	24-83961B01	3 turns
		RESISTOR, fixed: ±10%; 1/4 W:
[illegible]		NOT USED
[illegible]	6-124C73	10k
[illegible]	6-124C73	10k (TLN5893A & TLN5895A)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		NON-REFERENCED ITEMS
	1-80793B15	CIRCUIT BOARD ASSEMBLY (TLN5893A) includes:
	9-83011H01	CONTACT, female; 49 used
	14-84966D01	INSULATOR: .760 x .240"; 8 used
	39-10184A10	CONTACT, male: 3 used
	3-139495	SCREW, tapping: 6-20 x 5/16"; 4 used
	7-82626K01	BRACKET, filter (TLN5893A)
	14-82621K01	INSULATOR: 17.15 x .76" (TLN5893A)
	14-83375K01	INSULATOR: 9.560 x .900"
	42-83629G01	FASTENER, drive; 2 used
	1-80775B75	COVER ASSEMBLY, filter (TLN5894A & TLN5895A) includes:
	15-82173K01	COVER, filter
	1-80793B13	BRACKET ASSEMBLY, filter (TLN5894A) includes:
	7-82626K01	BRACKET, filter CAPACITORS C4-8, C12-16, C20, C21, C25, C29-33, C37-41, C45, C46, C50
	1-80793B16	CIRCUIT BOARD ASSEMBLY (TLN5894A & TLN5895A) includes:
	9-83011H01	CONTACT, female; 49 used
	14-84966D01	INSULATOR: .760 x .240"; 8 used
	39-10184A10	CONTACT, male; 3 used
	3-138162	SCREW, tapping: 4-40 x 3/8"; 6 used (TLN5894A & TLN5895A)
	42-84284B01	RETAINER, screw: 5 used (TLN5894A & TLN5895A)
	1-80793B14	BRACKET ASSEMBLY, filter (TLN5895A) includes:
	7-82626K01	BRACKET, filter CAPACITORS C4-25, C29-50



NOTES

[illegible] UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN PICOFARADS.

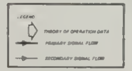
[illegible] FILTERING COMPONENTS ARE USED ONLY [illegible] PLATING INSTEAD. (PLATING RUNS AND FILTERING COMPONENTS DO NOT EXIST SIMULTANEOUSLY.)

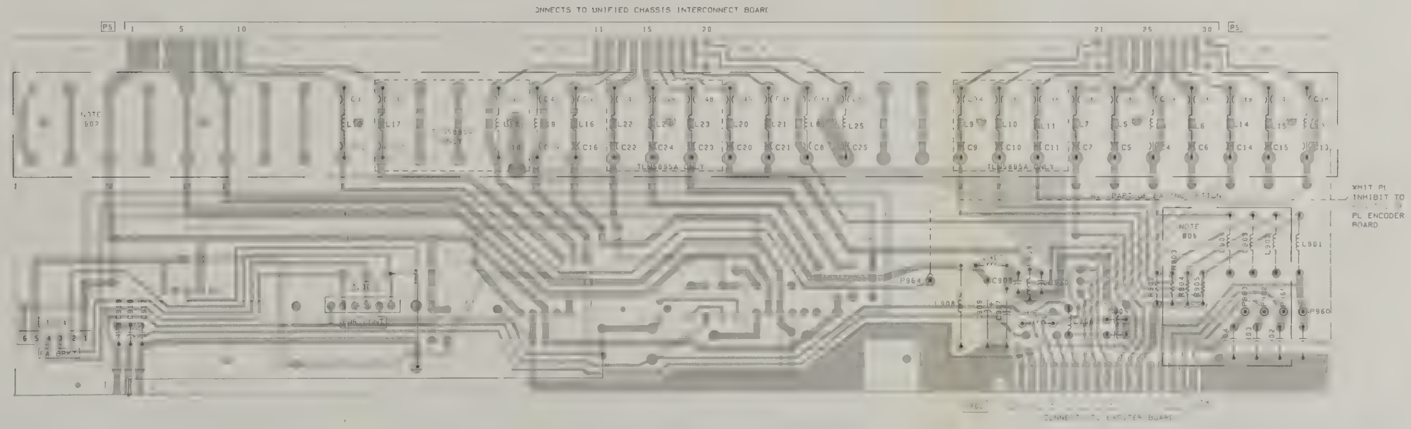
[illegible] FILTERING [illegible] AND BYPASS CAPACITORS ARE USED [illegible] TO PREVENT RF RADIATION FROM BEING CONDUCTED TO THE UNIFIED CHASSIS INTERCONNECT BOARD AND AFFECTING STATION OPERATION.

[illegible]

[illegible] CAPACITORS [illegible] SHUNT RF ENERGY ON THE A+, KEYED A+ AND POWER CONTROL LEADS TO GROUND.

[illegible] CAPACITORS [illegible] CHOKES [illegible] AND RESISTORS [illegible] NOT USED ON [illegible] (REPEATER) MODEL.




CONNECTS TO UNIFIED CHASSIS INTERCONNECT BOARD
P5
1
5
10
11
15
20
21
25
30
P5
WHIT PL INHIBIT TO PL ENCODER BOARD
CONNECTS TO EXCITER BOARD

SHOWN FROM SOLDER SIDE

COMPONENT SIDE BD-EEPS-22691-O
SOLDER SIDE ● BD-EEPS-22690-O
OL-EEPS-22[illegible]

TRANSMITTER INTERCONNECT BOARD

MODEL TLN5894A (RPTR)
MODEL TLN5893A (BASE)
MODEL TLN5895A (FULL FILTERING OPTION)

FUNCTION

--Interconnects most transmitter circuit boards to each other (except PA).

--Routes control functions from the unified chassis interconnect board to the transmitter.

--Repeater version includes unique transmitter filtering components.

--Includes partial control stage circuitry used to govern PA power output.

--Includes current limiter stage (base stations only) which is electrically functional with antenna network.

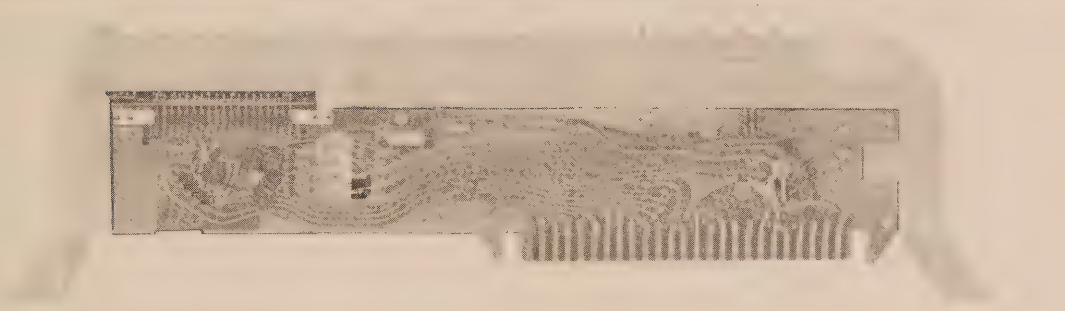
TRANSMITTER INTERCONNECT BOARD

TRANSMITTER INTERCONNECT BOARD

MODEL TLN4729B

EXCITER/DRIVER INTERCONNECT BOARD

MODEL TLN4743B



AEPS-8577-O

These interconnect boards connect most of the transmitter input and output functions to the station 50-conductor intercable. Two transmitter models are available:

--TLN4729B Transmitter Interconnect Board for all intermittent duty stations and all 72-76 MHz band continuous duty stations.

--TLN4743B Exciter/Driver Interconnect Board for all continuous duty stations except 72-76 MHz band continuous duty stations.

Two interconnect board models are available to permit two station transmitter "rack up" arrangements. One puts the entire transmitter on one "shelf" in the station. This arrangement is used for all intermittent duty stations and for 72-76 MHz stations. The exciter and power control board plug directly into the interconnect board.

With the other station arrangement, the transmitter is divided into separate exciter/driver and power amplifier/power control "shelves". This allows additional power amplifier heatsink capability. In this arrangement, only the exciter plugs directly into the interconnect board. The power control board picks up its A+, A-, and POWER CONTROL functions via separate wires from the power amplifier.

NOTE

72-76 MHz stations are continuous duty stations even though the transmitter occupies only one "shelf". RF output power is low enough so as not to require additional heat-sinking for continuous duty operation.

Filtering chokes, feedthru capacitors, and bypass capacitors are used on voltage and ground runs to prevent rf radiation from being conducted to the 50-conductor cable and affecting station operation. The feedthru capacitors are chassis mounted as indicated on the schematic diagram.

Filtering chokes L910 and L911 provide filtering for an optional built-in station metering kit. Capacitors C917, C918, and C919 are connected only on intermittent duty & 72-76 MHz stations. These capacitors shunt rf energy on the A+, KEYED A-, and POWER CONTROL leads to ground.

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REFERENCE
SYMBOL

PARTS L

TLN4729B and T
Exciter/Drive

C901
C903
C905
C906
C908
C910
C913, 914
C917, 918,
919

L901 thru 904
L905, 906,
907
L908
L909
L910, 911

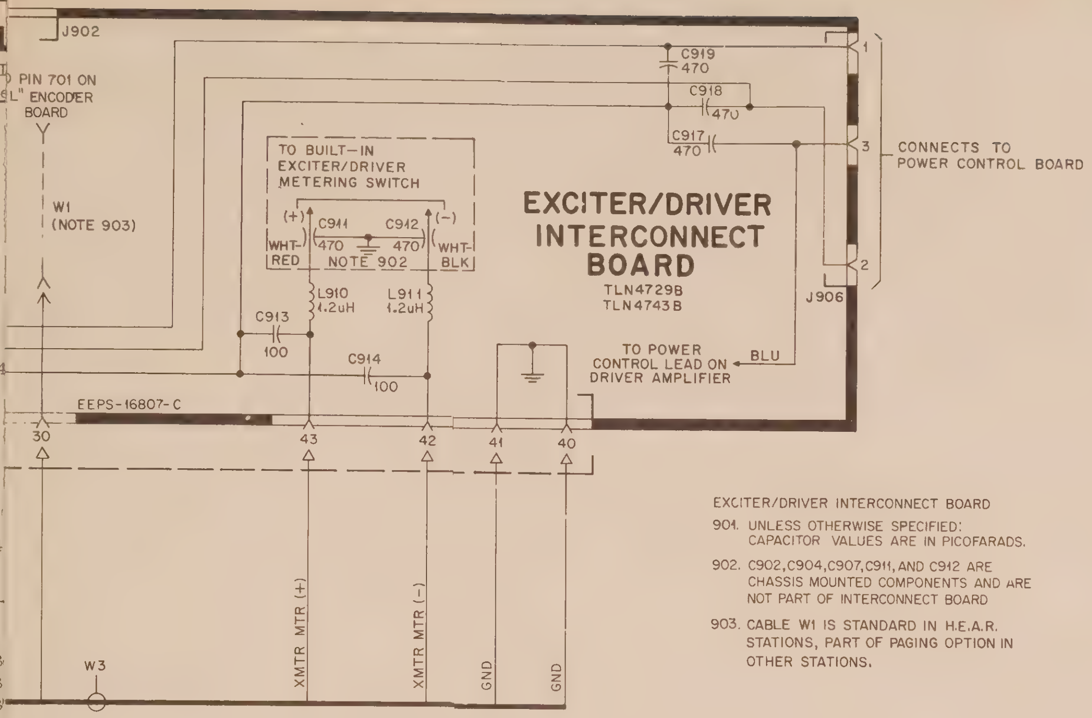
R901 thru 904
R905

TLN4728A/B
TLN4729A/B
TLN4743A/B
TLN4744A E
TLN4745A E
TLN4757A T
TLN4781A T
TLN5150A T

C902, 904,
907, 909
C911, 912

NOTE:

Additiona
Amplifie
Hardwar

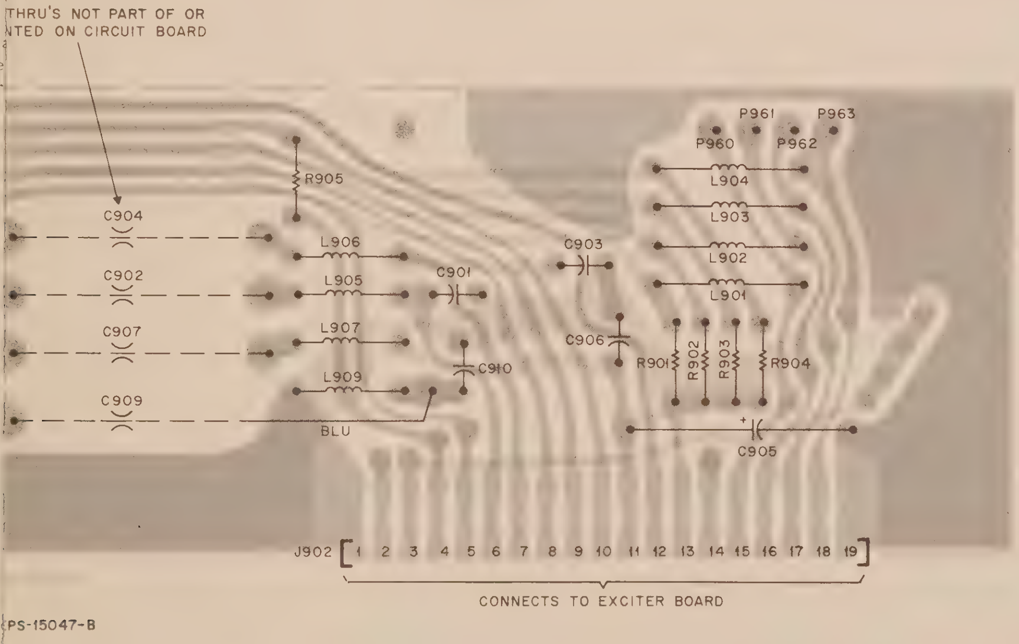

J902
PIN 701 ON
L" ENCODER
BOARD
W1
(NOTE 903)
C919
470
C918
470
C917
470
1
3
2
J906
CONNECTS TO
POWER CONTROL BOARD
TO BUILT—IN
EXCITER/DRIVER
METERING SWITCH
(+)
(−)
C911
470
C912
470
NOTE 902
WHT-
RED
WHT-
BLK
EXCITER/DRIVER
INTERCONNECT
BOARD
TLN4729B
TLN4743B
L910
1.2uH
L911
1.2uH
C913
100
C914
100
TO POWER
CONTROL LEAD ON
DRIVER AMPLIFIER
BLU
EEPS-16807-C
30
43
42
41
40
XMTR MTR (+)
XMTR MTR (−)
GND
GND
W3

EXCITER/DRIVER INTERCONNECT BOARD

901. UNLESS OTHERWISE SPECIFIED:
CAPACITOR VALUES ARE IN PICOFARADS.

902. C902,C904,C907,C911, AND C912 ARE
CHASSIS MOUNTED COMPONENTS AND ARE
NOT PART OF INTERCONNECT BOARD

903. CABLE W1 IS STANDARD IN H.E.A.R.
STATIONS, PART OF PAGING OPTION IN
OTHER STATIONS.


THRU'S NOT PART OF OR
NTED ON CIRCUIT BOARD
P961
P963
P960
P962
R905
L904
L903
L902
L901
C904
C902
C907
C909
L906
L905
L907
L909
C901
C903
C906
C910
R901
R902
R903
R904
C905
BLU
J902
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
CONNECTS TO EXCITER BOARD
PS-15047-B

TRANSMITTER INTERCONNECT BOARD

TLN4729B Transmitter Interconnect Board
and TLN4743B Exciter/Driver Interconnect Board
Schematic Diagram and Circuit Board Detail
Motorola No. PEPS-16960-E
5/1/77-UP

[illegible]ENCE [illegible]	MOTOROLA PART NO	DESCRIPTION

PARTS LIST

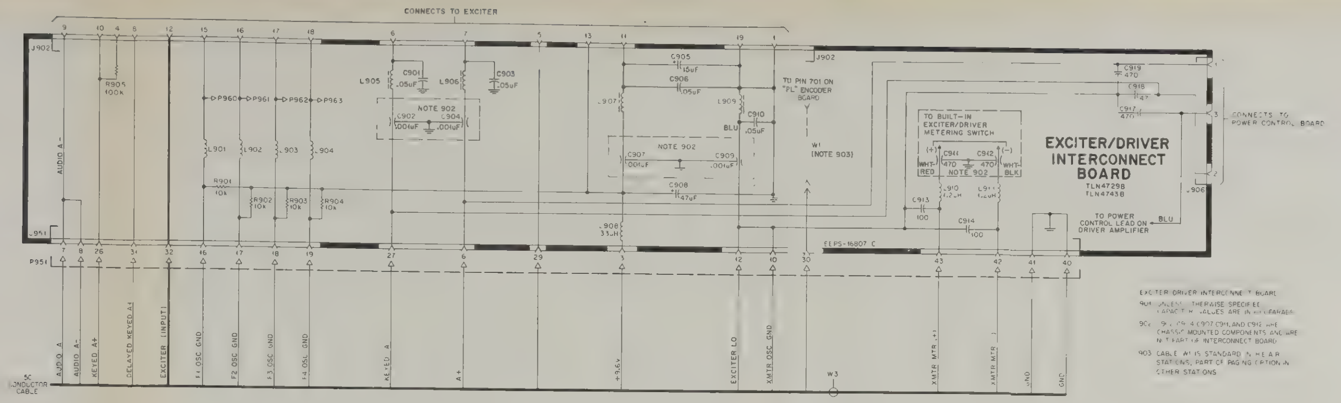
[illegible]

[illegible]	[illegible]	[illegible]

[illegible]

[illegible]	[illegible]	[illegible]

[illegible]

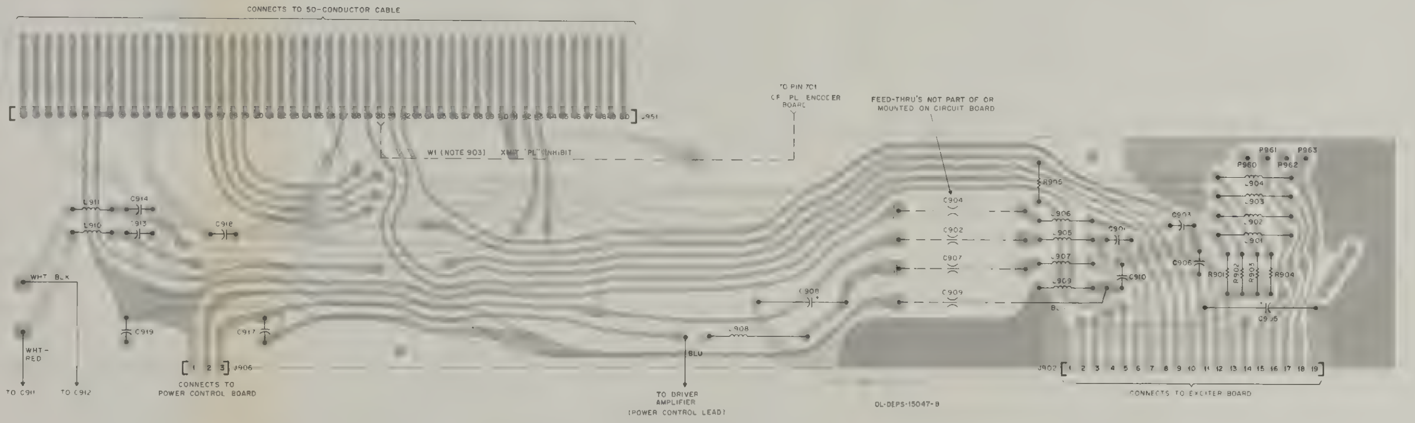

CONNECTS TO EXCITER
J902
J951
P951
AUDIO A-
R905 100k
P960
P961
P962
P963
L901
L902
L903
L904
R901 10k
R902 10k
R903 10k
R904 10k
L905
C901 .05uF
L906
C903 .05uF
NOTE 902
C902 .001uF
C904 .001uF
C905 .15uF
C906 .05uF
L907
L909
BLU
C910 .05uF
NOTE 902
C907 .001uF
C909 .001uF
C908 .47uF
L908 33uH
TO PIN 701 ON "PL" ENCODER BOARD
W1 (NOTE 903)
TO BUILT-IN EXCITER/DRIVER METERING SWITCH
C911 470
C912 470
WHT-RED
WHT-BLK
NOTE 902
L910 1.2uH
L911 1.2uH
C913 100
C914 100
C919 470
C918 47
C917 470
CONNECTS TO POWER CONTROL BOARD
J906
EXCITER/DRIVER INTERCONNECT BOARD
TLN4729B
TLN4743B
TO POWER CONTROL LEAD ON DRIVER AMPLIFIER
EEPS-16807-C
50 CONDUCTOR CABLE
AUDIO A
AUDIO A+
KEYED A+
DELAYED KEYED A+
EXCITER (INPUT)
F1 OSC GND
F2 OSC GND
F3 OSC GND
F4 OSC GND
KEYED A
A+
+9.6V
EXCITER LO
XMTR OSC GND
W3
XMTR MTR (+)
XMTR MTR (-)
GND
GND

EXCITER/DRIVER INTERCONNECT BOARD

901 UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN [illegible]FARADS

902 [illegible] C907 C911, AND C912 ARE CHASSIS MOUNTED COMPONENTS AND ARE NOT PART OF INTERCONNECT BOARD

903 CABLE W1 IS STANDARD IN HEAR STATIONS, PART OF PAGING OPTION IN OTHER STATIONS


CONNECTS TO 50-CONDUCTOR CABLE
J951
TO PIN 701 OF "PL" ENCODER BOARD
W1 (NOTE 903)
XMIT "PL" INHIBIT
FEED-THRU'S NOT PART OF OR MOUNTED ON CIRCUIT BOARD
L911
C914
L910
C913
C918
WHT BLK
WHT-RED
C919
C917
J906
TO C911
TO C912
CONNECTS TO POWER CONTROL BOARD
C908
L908
BLU
TO DRIVER AMPLIFIER (POWER CONTROL LEAD)
C904
C902
C907
C909
R905
L906
L905
L907
L909
C901
C910
C903
C906
R901
R902
R903
R904
L901
L902
L903
L904
P960
P961
P962
P963
C905
J902
CONNECTS TO EXCITER BOARD
DL-DEPS-15047-B

SHOWN FROM COMPONENT SIDE

TRANSMITTER INTERCONNECT BOARD

TLN4729B Transmitter Interconnect Board
and TLN4743B Exciter/Driver Interconnect Board
Schematic Diagram and Circuit Board Detail
Motorola No. PEPS-16960-E
5/1/77-UP

EXCITER

MODEL	FREQUENCY
TLD5321A	132-150.8 MHz
TLD5322A	150.8-174 MHz

TECHNICAL CHARACTERISTICS

	MODEL TLD5321A	MODEL TLD5322A
FREQUENCY	132-150.8 MHz	150.8-174 MHz
NUMBER OF CHANNELS	1 to 4	
MAXIMUM FREQUENCY SEPARATION	±750 kHz	
OSCILLATOR FREQUENCY	11-14.5 MHz	
FREQUENCY MULTIPLICATION	12 times	
OUTPUT POWER	400 milliwatts	
OUTPUT IMPEDANCE	50 ohms	
MODULATOR TYPE	Direct FM	
DEVIATION	±5 kHz, adjustable instantaneous deviation limiting	
AUDIO RESPONSE	6 dB/octave pre-emphasis 300 to 3000 Hz	
AUDIO SENSITIVITY	165 millivolts for ±3.0 kHz deviation	
AUDIO DISTORTION	Less than 3% at ±3.0 kHz deviation from 300 to 3000 Hz	
POWER REQUIREMENTS	Regulated +9.6 volts dc @150 mA +13.6 volts dc @100 mA	
CONSTRUCTION	Fully solid-state	
METERING	Five test points critical to operation and alignment are accessible at a metering receptacle which permits testing with an optional built-in station meter, Motorola portable test set, or 0-50 uA microammeter with 2,000 ohms series resistance.	

1. DESCRIPTION

1.1 Models TLN5321A and TLN5322A Exciter provides the low power excitation for an FM transmitter. Up to four plug-in channel elements, one for each transmitter operating frequency, are used to develop a direct FM carrier signal of at least 400 milliwatts.

1.2 The exciter is directly frequency-modulated for crystal-controlled frequency operation in the 132-174 MHz range. It consists of a symmetrical clipper and splatter filter, emitter follower, channel element(s) (voltage controlled crystal oscillator), buffer amplifier, tripler, first doubler, second doubler, and output amplifier. The fundamental crystal frequency is multiplied by twelve to provide the final output frequency.

1.3 When the exciter is used in "Private-Line" stations, a "Private-Line" encoder circuit

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board is plugged directly into the mating pins of the exciter; and one jumper (JU402) is removed from the exciter; no interconnecting wires are used. The exciter board also includes additional pins that permit the board to be used with certain types of optional equipment. These pins are designated P403 on the exciter schematic diagram.

2. FUNCTIONAL OPERATION

Refer to the exciter block diagram and the exciter schematic diagram included in this section.

2.1 DEVIATION LIMITING CIRCUIT

2.1.1 Microphone output audio is applied to the symmetrical clipper and splatter filter. This circuit, together with amplifier U401, provides pre-emphasis, amplification, and limiting of the microphone audio. Microphone audio is then applied to emitter follower Q401 (together with "PL" code) through IDC control to the channel elements.

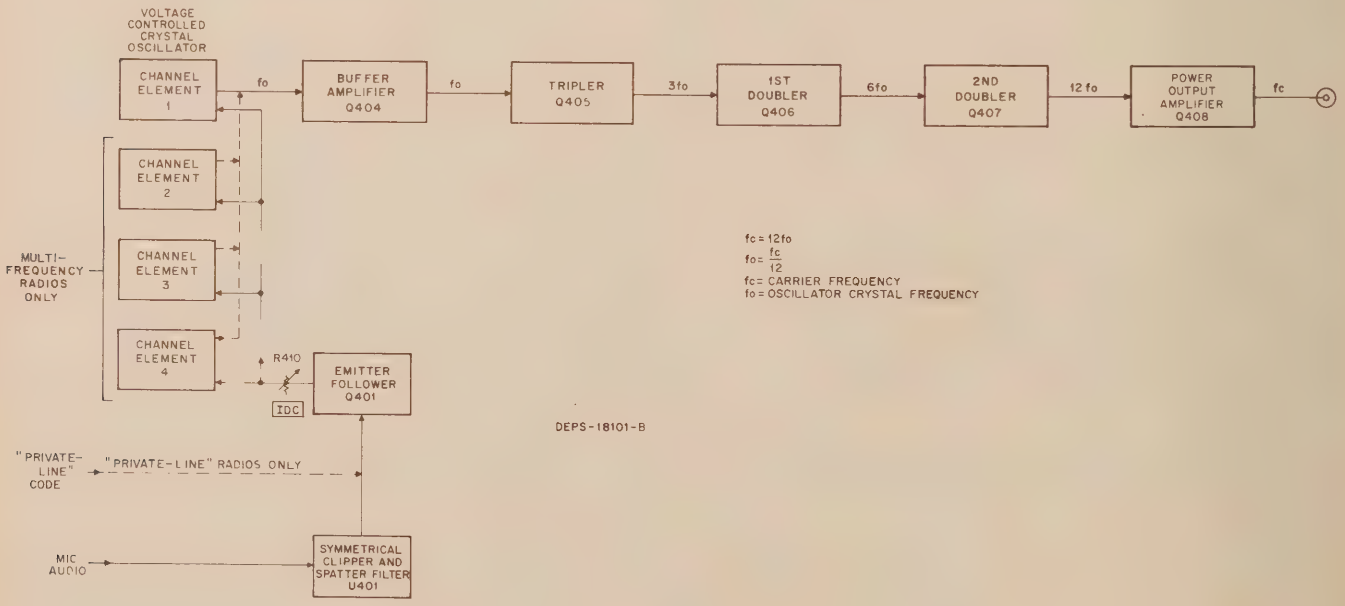
2.1.2 The output of the emitter follower is developed across IDC potentiometer R410. This audio signal can be monitored at pin 1 of the exciter metering receptacle. The potentiometer adjusts the maximum level of audio coupled to the oscillator-modulator, thus setting the amount of deviation.

2.1.3 In "Private-Line" radios, a low amplitude "Private-Line" code is continuously injected into the oscillator-modulator from the "Private-Line" encoder. This code range will produce 0.5 to 1.0 kHz deviation.

2.2 MODULATOR-OSCILLATOR STAGE (CHANNEL ELEMENT)

2.2.1 The combination modulator-oscillator stage (channel element) produces a low-power crystal frequency signal modulator at an audio rate. This signal is multiplied twelve times and amplified in following stages to produce the carrier signal. The channel element consists of a parallel combination varactor and warping capacitor connected in series with a crystal. A change in capacitance seen at the crystal terminals will cause the crystal to vary its resonant frequency in proportion to the capacitance change. The audio voltage from the audio and IDC circuitry is applied to the varactor to cause a change in capacitance; this variation in turn causes the frequency to change at the same audio rate.

2.2.2 Channel elements are highly stable crystal-controlled oscillators. They use unheated crystals in an oscillator circuit that is temperature compensated over the entire temperature range of -30°C to +60°C (-22°F to +140°F). A variable warp capacitor in the base


VOLTAGE CONTROLLED CRYSTAL OSCILLATOR
CHANNEL ELEMENT 1
fo
BUFFER AMPLIFIER Q404
fo
TRIPLER Q405
3fo
1ST DOUBLER Q406
6fo
2ND DOUBLER Q407
12 fo
POWER OUTPUT AMPLIFIER Q408
fc
CHANNEL ELEMENT 2
CHANNEL ELEMENT 3
CHANNEL ELEMENT 4
MULTI-FREQUENCY RADIOS ONLY
R410
IDC
EMITTER FOLLOWER Q401
fc = 12fo
fo = $\frac{fc}{12}$
fc = CARRIER FREQUENCY
fo = OSCILLATOR CRYSTAL FREQUENCY
DEPS-18101-B
"PRIVATE-LINE" CODE
"PRIVATE-LINE" RADIOS ONLY
MIC AUDIO
SYMMETRICAL CLIPPER AND SPATTER FILTER U401

Exciter Block Diagram

of each channel element is accessible through a hole in the exciter circuit board for fine frequency adjustment. Each channel element is a factory sealed, plug-in module which provides a train of stable frequency positive pulses.

2.2.3 The exciter accepts up to four channel elements - one channel element is required for each frequency. Only one frequency may be selected at a time, but transmission is possible on as many as four separate frequencies. A power input of +9.6 volts is applied to the channel element(s) continuously while the station is turned ON. Channel element output is developed only when a switched ground generated by the local or remote control unit is present. In single-frequency receivers, this switched ground is applied to a specific channel element as determined by the frequency selector switch associated with the station. An indication of the channel element output is available at pin 2 of the metering socket. This allows channel element operation to be easily checked with optional built-in station metering or with a Motorola Portable test set.

NOTE

If the station is equipped with a time-out timer module and the timer times out, keyed A- is removed from the modulator-oscillator(s) and the entire transmitter is shut down.

2.3 BUFFER AMPLIFIER

The buffer amplifier, Q404, is biased to operate as a Class A amplifier and provides reserve gain to isolate the modulator-oscillator from the succeeding stages.

2.4 MULTIPLIERS AND EXCITER POWER AMPLIFIER

2.4.1 The multipliers develop an output signal that is 12 times the channel element frequency and a final power amplifier gives power gain and matches the output impedance to 50 ohms.

2.4.2 The buffer amplifier output is developed across two parallel resonant tank circuits at the channel element frequency. Tripler Q405 operates as a Class C amplifier with its parallel resonant output tuned to the third harmonic of its input. Thus the output of the tripler is three times the channel element frequency. A meter connected at pin 3 of the metering receptacle measures the average dc base current which is proportional to input signal strength.

2.4.3 The first doubler circuit operates very similar to the tripler except its output is tuned to the second harmonic of its input and its drive is metered at pin 4. The output of the doubler is six times the channel element frequency.

2.4.4 The second doubler circuit also operates similar to the tripler with its output tuned to the second harmonic of its input. The drive to the second doubler is metered on pin 5 of the metering receptacle. The output signal is 12 times the channel element frequency and is the carrier frequency of the transmitter.

2.4.5 The exciter power amplifier also operates as a Class C amplifier. The amplifier provides at least 400 milliwatts of frequency modulated signal at the carrier frequency to the power amplifier section of the transmitter.

3. MAINTENANCE

3.1 METERING

The exciter is equipped with a metering receptacle which allows five major test points to be measured. The output of the exciter (input to the power amplifier) can be measured by using the metering receptacle on the power amplifier. With the portable test set connected to the metering receptacles, or by using the built-in station metering kit (if so equipped), readings may be made at each of the major test points in the circuit by merely rotating a selector switch. A failure in almost any portion of the exciter will produce a low or zero meter reading for one or more of the test points. Improper alignment will also cause improper meter readings.

NOTE

The exciter board must be installed in the transmitter for testing to provide the necessary power, ground, control and signal connections. The circuit board should always be secured in place with all mounting screws for operation and testing to provide good rf ground to all stages of the exciter. The exciter may be tested while installed in the station--usually the preferred method. However, if desired, it can be bench tested in a "Micor" mobile radio, except that the time-out timer is inoperative.

TYPICAL EXCITER METER READINGS

SELECTOR SWITCH POSITION	REFERENCE SWITCH POSITION (TEST SET ONLY)	READING	CIRCUIT METERED	IF LOW, THE DEFECTIVE CIRCUIT IS
1	A	2 (no mod) 6 (1 V rms @ 1 kHz exciter board pins 1 & 12)	Audio output of IDC circuit.	IDC circuit
2	A	25	Channel element output.	Channel element
3	A	38	Tripler input	Modulator or Tripler
4	A	22	1st doubler input	Tripler or 1st doubler
5	A	25	2nd doubler input	1st doubler or 2nd doubler

3.1.1 Built-In Station Metering

Step 1. The output of the exciter must be terminated into its normal point, the bandpass filter. The output of the power amplifier must be terminated in a 50-ohm dummy load or an antenna.

Step 2. Turn station ON.

Step 3. Set selector switch to position 1. Key the transmitter and whistle into the microphone long enough to observe the meter reading.

Step 4. Set selector switch to positions 2, 3, 4, and 5 respectively, keying the transmitter and observing the meter readings for each position (whistling not required). On multi-frequency stations, repeat the readings for each exciter frequency. An analysis of the meter readings for determining whether each circuit is good or bad follows in the "Performance Tests" paragraph.

3.1.2 Portable Test Set

Step 1. Connect the 20-pin plug of the test set adapter cable to the test set. When the test set is not in use, disconnect the 20-pin plug to conserve battery life. The plug acts as an on-off switch completing the battery circuit.

Step 2. Connect the red "control" plug of the adapter cable to the control receptacle on the local or remote control circuit board. Connect the white "metering" plug of the adapter cable to the metering receptacle on the exciter circuit board.

Step 3. Set function selector switch to the XMTR position.

Step 4. Set oscillator and meter reversing switch to OFF position.

Step 5. Set 1 V-100 mV switch on the adapter cable to the 100 mV position (TEK-37). On the later version adapter cable (TEK-37A), the switch is omitted and the unit operates at 100 mV sensitivity.

Step 6. Set the REF A-B switch on the adapter cable to position A.

Step 7. The output of the exciter must be terminated into its normal point, the bandpass filter. The output of the power amplifier must be terminated in a 50-ohm dummy load or an antenna.

Step 8. Turn station ON.

Step 9. Connect a microphone to the microphone receptacle on the portable test set or to the local or remote control board.

Step 10. Set selector switch to position 1. Key the transmitter and whistle into the microphone long enough to observe the meter reading.

Step 11. Set selector switch to positions 2, 3, 4, and 5 respectively, keying the transmitter with the XMTR ON pushbutton on the test set or the push-to-talk switch on the microphone and observing the meter reading for each position. On multi-frequency stations, repeat the readings for each exciter frequency. An analysis of the meter readings for determining whether each circuit is good or bad follows in the "Performance Tests" paragraph.

Step 12. Move the "metering" plug to the power amplifier metering receptacle and observe the meter readings for selector switch position 1. The reference A-B switch must be set to the B position and the meter reversing switch to METER REV.

Each time maintenance is performed on the exciter, the readings should be compared with the previous set of readings. Any degradation of performance will quickly be noted.

3.2 PERFORMANCE TESTS

The performance tests may be used for troubleshooting to isolate the point of abnormal performance. They may also be used after repair and alignment to assure that the exciter meets all specifications before it is returned to service.

3.2.1 Power Output Test

Step 1. Connect the equipment as connected for Metering (paragraph 3.1), except connect the test set "metering" plug to the power amplifier metering receptacle.

Step 2. Set selector switch to position 1. This checks the input to the power amplifier (output of the exciter). A meter reading of at least 20 uA equals an rf signal level of 400 milliwatts.

Step 3. On multi-frequency stations of ±750 kHz separation, repeat the test for each exciter frequency. Select the frequency to be tested by the frequency selector switch associated with the station. The test set meter should indicate at least 20 uA for each frequency.

3.2.2 Frequency Test

Step 1. Terminate the transmitter in an antenna and measure the radiated signal with a Motorola digital frequency meter and deviation monitor or other highly accurate frequency measuring device (±.00005% or better).

NOTE

When high stability channel elements are used, carrier frequency must be within .0002%.

Step 2. Key the transmitter to produce an unmodulated carrier signal. In "Private-Line" tone-coded stations disable the "Private-Line" encoder by unplugging the "Vibrasender" resonant reed. In "Digital Private-Line" stations, disable the code by shorting together the two "code disable" pins on the PL encoder board.

NOTE

Do not use the push-to-talk switch on the microphone. Background noise will modulate the signal.

Step 3. Read the transmitter output frequency. On multi-frequency stations, repeat the test for each frequency.

Step 4. If adjustment is required, set the "warp" capacitor on the associated channel element for the assigned frequency output. For best accuracy, the radio set should be brought to room temperature (+70° to 75°F) and the test equipment thoroughly warmed up. This brings the channel element to the center of its temperature compensation range.

3.2.3 Deviation Test

Step 1. Terminate the transmitter output in an antenna and measure the radiated signal with a deviation meter.

Step 2. In "Private-Line" tone-coded squelch stations, re-insert the "Vibrasender" resonant reed if it was removed in the previous test. In "Digital Private-Line" stations, remove the code disable short. Key the transmitter with only "Private-Line" code modulation. The deviation meter should indicate 0.5 to 1 kHz.

Step 3. Connect an audio oscillator output to exciter board pins 1 (Gnd) and 12 (Audio High). Adjust the audio oscillator to 1000 Hz and 1 volt as measured on an AC voltmeter. The deviation meter should indicate ±5 kHz deviation.

Step 4. Adjust the audio oscillator over the entire 300 to 3000 Hz range, keeping the audio level at approximately 1 volt. The deviation meter should never exceed ±5 kHz nor drop below ±2.5 kHz.

3.2.4 Audio Sensitivity Test

Step 1. After completion of the Deviation Test, reduce the output of the audio oscillator to 130 millivolts at 1000 Hz.

Step 2. The deviation meter should indicate approximately ±3.0 kHz. Meter position 1 may be noted at this time for future reference. Future audio sensitivity checks may then be made by comparing the meter 1 reading with the reference value.

3.3 TROUBLESHOOTING

3.3.1 If there are no test set indications at one or more of the metered points, check the dc input voltages to the exciter circuit board.

P402-11 & 13	+9.6 volts in respect to chassis
P402-6	Keyed A- (approximately -13.6 volts in respect to A+, pin 7).

3.3.2 If test set indications localize the trouble to a specific stage or two, measure the dc input voltages to the suspected stages. Refer to the schematic diagram for the nofmal voltages.

NOTE

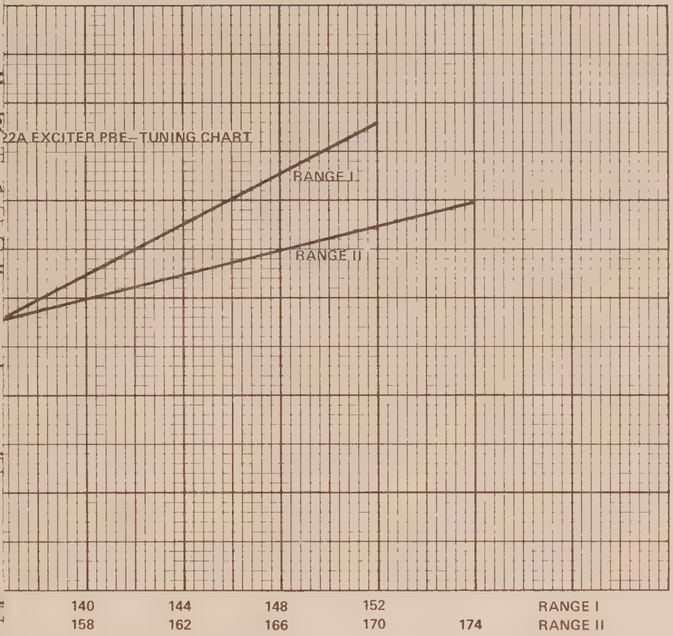
In "Private-Line" stations, the transmitter cannot be keyed if the PL encoder is removed unless a jumper (JU402) is connected from pin 8 to pin 10 of the exciter to complete the keying circuit. This jumper is permanently connected in exciters for non-"Private-Line" operation.

ALIGNMENT PF

TEP	ADJUST	METERING PLUG LOCATION	SELECTOR SWITCH POSITION	METER SWITCH REF A SWITC (SEE NO
1				
2	POWER SET			
3	FRE-QUENCY SWITCH	EXCITER	2	OFF RE
4	ALL EXCITER COILS	EXCITER	5	OFF RE
5	L401	EXCITER	2	OFF RE
6	L401, L402	EXCITER	3	OFF RE
7	L403	EXCITER	3	OFF RE
8	L403, L404	EXCITER	4	OFF RE
9	L405	EXCITER	4	OFF RE
10	L405, L406	EXCITER	5	OFF RE
11	L407 L408	EXCITER	5	OFF RE
12	L407, L408	PA	1	METER REF A
13				
14				

METERING

Alignment may be performed using S1059B Portable Test Set or optior ing. The OSC. & METER REV. S portable test set usage -- polarity as required when built-in station n readings are based on a two-thous series resistance in the meter. T a two-thousand ohm series resista corrected.



AEPS–17626–O

ENCY ADJUSTMENT

e transmitter with the XMTR ON pushbutton on the one). On "Private-Line" stations, unplug the "Vibra- ator. On "Digital Private-Line" stations short to- rivate-Line" encoder board. the selected channel to the exact desired frequency. annel element warp capacitor. On multi-frequency esponds to the frequency selector switch setting; re-

ENT PROCEDURES

TE

iation must be measured with a with RTC-4000A Deviation Meter requency response of less than 1 Hz,

uency *before* setting "IDC". Connect the audio and 12, Audio High).

On tone "Private-Line" models, replace the rivate-Line" models, remove the short from

l for ±5 kHz deviation.

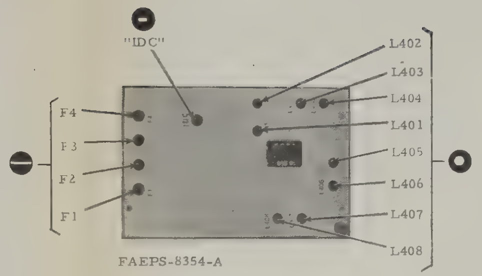
Essentially full deviation should still be ate a weak audio stage.

ALIGNMENT PROCEDURE

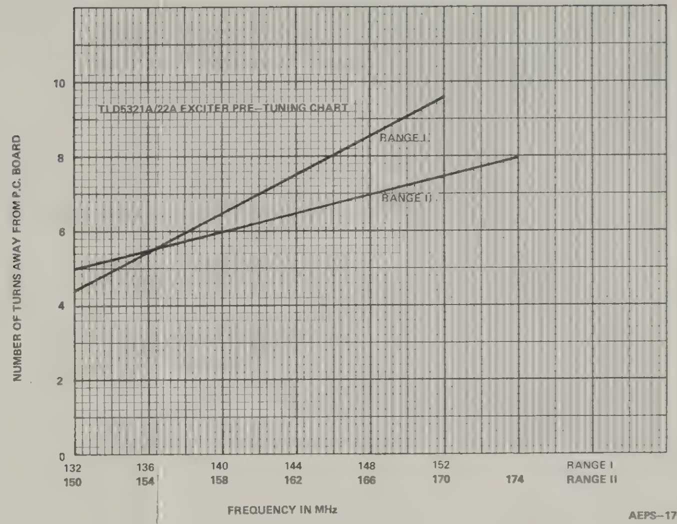
STE	ADJUST	METERING PLUG LOCATION	SELECTOR SWITCH POSITION	METER REV. SWITCH AND REF A-B SWITCH (SEE NOTE)	STAGE AND PROCEDURE
1					SET UP - Key the transmitter with the XMTR ON pushbutton on the portable test set.
2	POWER SET				OUTPUT - Turn the POWER SET control fully counterclockwise. Unkey the transmitter.
3	FREQUENCY SWITCH	EXCITER	2	OFF REF A	CHANNEL ELEMENT - Select the desired frequency on multi-frequency stations. Key the transmitter. The test set meter 2 should indicate at least 10 uA.
4	ALL EXCITER COILS	EXCITER	5	OFF REF A	PRE-ALIGNMENT - If the exciter is completely untuned and shows no meter 5 readings, set cores of tuning coils L401 to L406 to the top of their coil forms (away from circuit board). Set cores of L407 and L408 per the exciter pre-tuning chart. If a meter 5 reading is available proceed to step 7.
5	L401	EXCITER	2	OFF REF A	BUFFER OUTPUT - Tune L401 for minimum meter reading.
6	L401, L402	EXCITER	3	OFF REF A	BUFFER OUTPUT - Tune L402 and then L401 for peak meter reading.
7	L403	EXCITER	3	OFF REF A	TRIPLER OUTPUT - Tune L403 for minimum meter reading.
8	L403, L404	EXCITER	4	OFF REF A	TRIPLER OUTPUT - Tune L404 and then L403 for peak meter reading.
9	L405	EXCITER	4	OFF REF A	FIRST DOUBLER OUTPUT - Tune L405 for minimum meter reading.
10	L405, L406	EXCITER	5	OFF REF A	SECOND DOUBLER OUTPUT - Tune L406, and then L405 for peak meter reading.
11	L407 L408	EXCITER	5	OFF REF A	EXCITER OUTPUT - Tune L407 then L408 for peak meter reading.
12	L407, L408	PA	1	METER REV REF A	EXCITER OUTPUT - Move the metering plug to the PA. Tune L408 and then L407 for peak meter reading.
13					Repeat steps 6, 8 and 10.
14					Align the power amplifier.

METERING NOTE

Alignment may be performed using a Motorola S1056B thru S1059B Portable Test Set or optional built-in station metering. The OSC. & METER REV. SWITCH column refers to portable test set usage -- polarity is automatically reversed as required when built-in station metering is used. All meter readings are based on a two-thousand ohm (2000Ω) equivalent series resistance in the meter. Therefore, meters not having a two-thousand ohm series resistance must have their readings corrected.



FAEPS-8354-A



AEPS-17626-O

OSCILLATOR FREQUENCY ADJUSTMENT

1. Key the transmitter with no modulation (key the transmitter with the XMTR ON pushbutton on the portable test set rather than with the microphone). On "Private-Line" stations, unplug the "Vibrasender" resonant reed from the PL tone generator. On "Digital Private-Line" stations short together the code disable pins on the "Digital Private-Line" encoder board.
2. Adjust the channel element warp capacitor for the selected channel to the exact desired frequency. On single-frequency models, adjust the F1 channel element warp capacitor. On multi-frequency models, adjust the warp capacitor which corresponds to the frequency selector switch setting; repeat for each frequency.

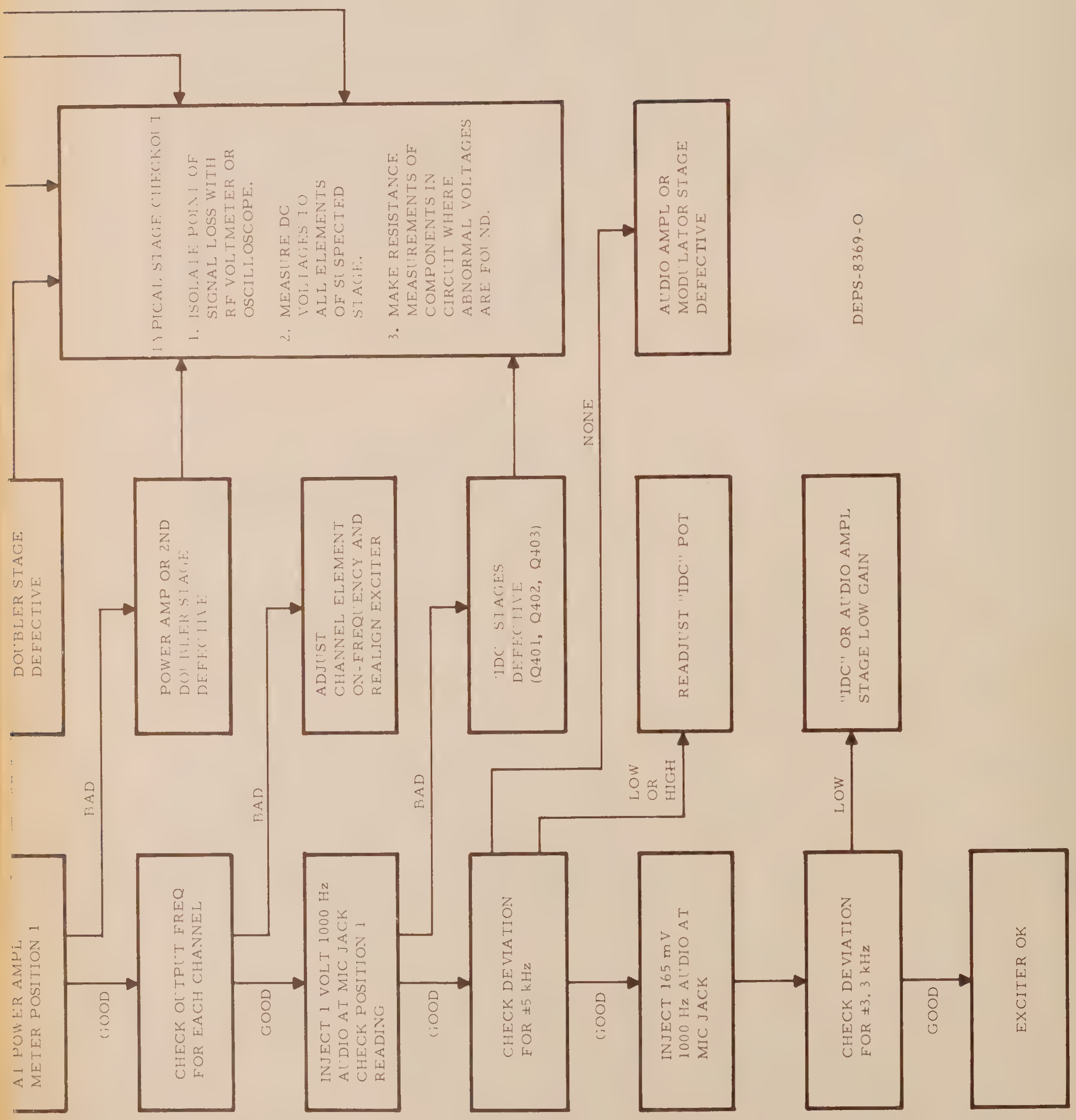
"IDC" ADJUSTMENT PROCEDURES

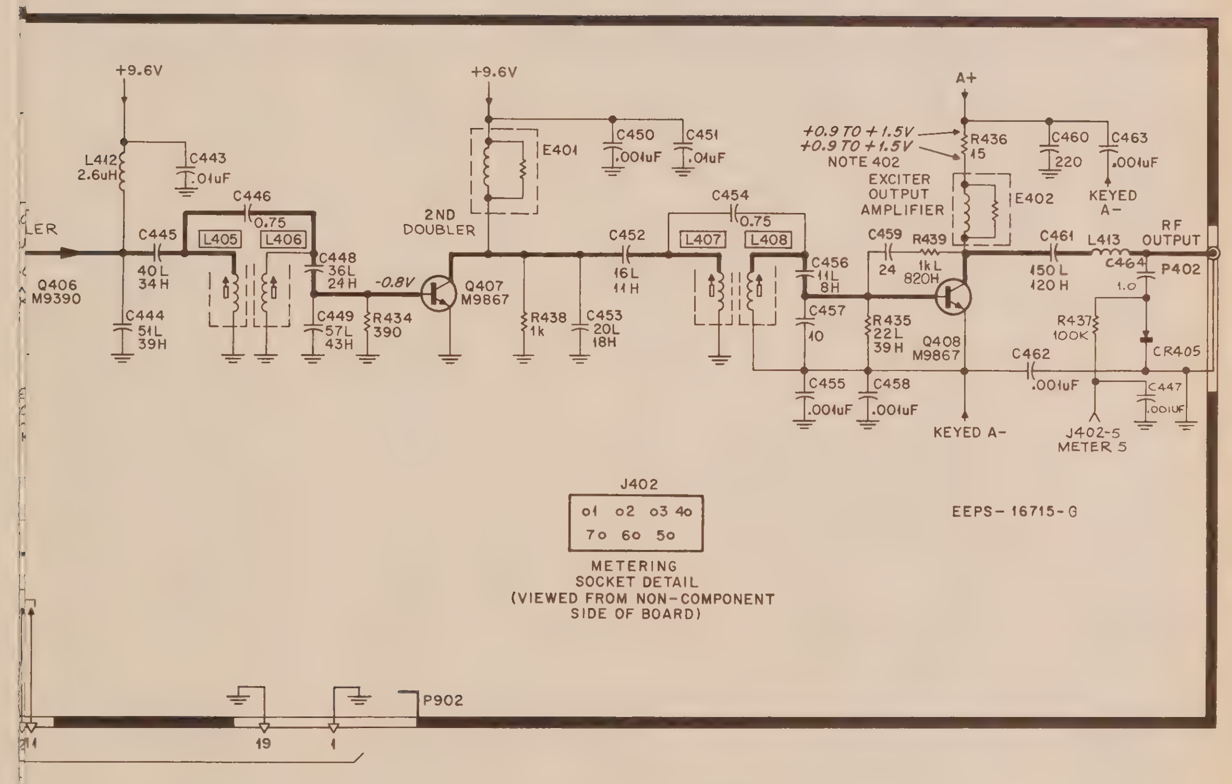
NOTE

For "Digital Private-Line" stations, deviation must be measured with a Motorola R-1200 Series Service Monitor with RTC-4000A Deviation Meter Plug-In Module that has been modified for frequency response of less than 1 Hz, or equivalent.

1. Each channel element must be "warped" on frequency before setting "IDC". Connect the audio oscillator to the exciter input (pins 1, GND, and 12, Audio High).
2. Set the audio oscillator to 1000 Hz and 1 volt. On tone "Private-Line" models, replace the "Vibrasender" resonant reed. On "Digital Private-Line" models, remove the short from the code disable pins.
3. Key the transmitter and adjust the IDC control for ±5 kHz deviation.
4. Reduce the tone oscillator output to .25 volt. Essentially full deviation should still be indicated. Less than full deviation may indicate a weak audio stage.

OTING CHART


TYPICAL STAGE CHECKOUT
1. ISOLATE POINT OF SIGNAL LOSS WITH RF VOLTMETER OR OSCILLOSCOPE.
2. MEASURE DC VOLTAGES TO ALL ELEMENTS OF SUSPECTED STAGE.
3. MAKE RESISTANCE MEASUREMENTS OF COMPONENTS IN CIRCUIT WHERE ABNORMAL VOLTAGES ARE FOUND.
AUDIO AMPL OR MODULATOR STAGE DEFECTIVE
DEPS-8369-O
NONE
DOUBLER STAGE DEFECTIVE
POWER AMP OR 2ND DOUBLER STAGE DEFECTIVE
ADJUST CHANNEL ELEMENT ON-FREQUENCY AND REALIGN EXCITER
IDC STAGES DEFECTIVE (Q401, Q402, Q403)
READJUST "IDC" POT
"IDC" OR AUDIO AMPL STAGE LOW GAIN
BAD
BAD
BAD
LOW OR HIGH
LOW
A1 POWER AMPL METER POSITION 1
GOOD
CHECK OUTPUT FREQ FOR EACH CHANNEL
GOOD
INJECT 1 VOLT 1000 Hz AUDIO AT MIC JACK CHECK POSITION 1 READING
GOOD
CHECK DEVIATION FOR ±5 kHz
GOOD
INJECT 165 mV 1000 Hz AUDIO AT MIC JACK
CHECK DEVIATION FOR ±3.3 kHz
GOOD
EXCITER OK


+9.6V
L412
2.6uH
C443
.01uF
C446
0.75
LER
C445
L405
L406
C448
36L
24H
40L
34H
Q406
M9390
C444
51L
39H
C449
57L
43H
R434
390
-0.8V
+9.6V
E401
C450
.001uF
C451
.01uF
2ND
DOUBLER
Q407
M9867
R438
1k
C452
16L
11H
C453
20L
18H
C454
0.75
L407
L408
C456
11L
8H
C457
10
C455
.001uF
A+
+0.9 TO +1.5V
+0.9 TO +1.5V
NOTE 402
R436
15
EXCITER
OUTPUT
AMPLIFIER
E402
C460
220
C463
.001uF
KEYED
A-
C459
24
R439
1k L
820H
R435
22L
39H
Q408
M9867
C458
.001uF
KEYED A-
C461
150L
120H
L413
RF
OUTPUT
C464
1.0
P402
R437
100K
CR405
C462
.001uF
C447
.001UF
J402-5
METER 5
J402
o1 o2 o3 4o
7o 6o 5o
METERING
SOCKET DETAIL
(VIEWED FROM NON-COMPONENT
SIDE OF BOARD)
EEPS-16715-G
P902
19
1

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ASURED
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S.
TIONS.
1–10,
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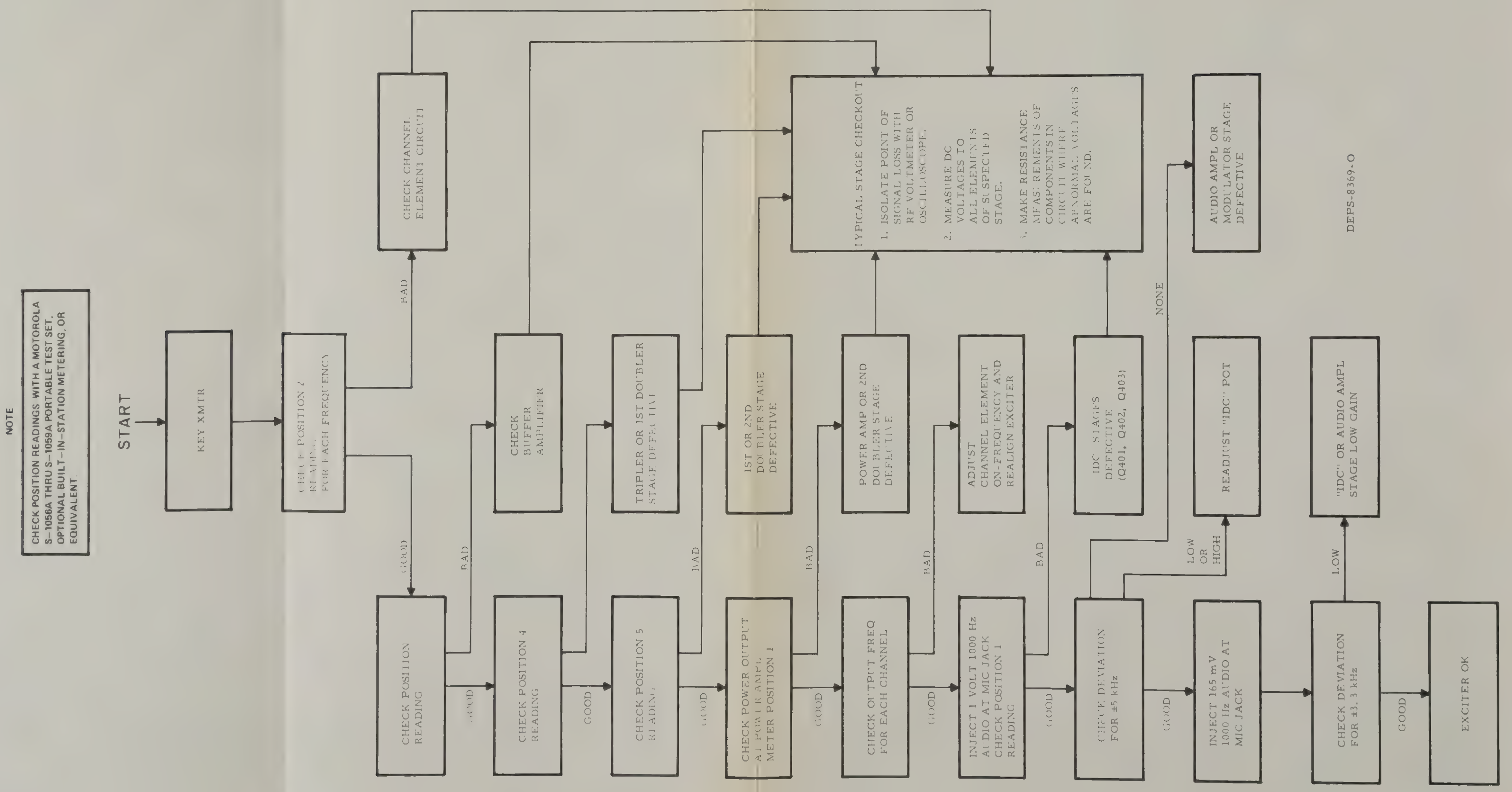
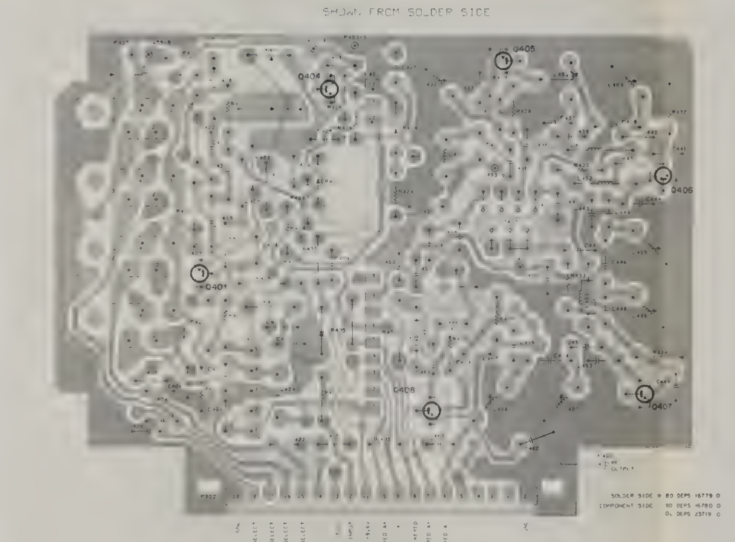
00 HZ

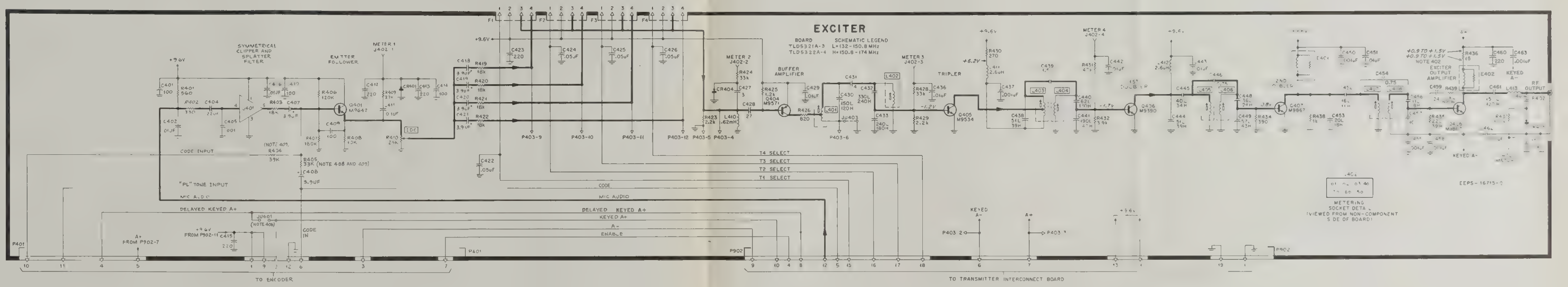
PREVIOUS REVISIONS AND PARTS LIST
SHOWN ON BACK OF THIS DIAGRAM

TLD5320A Series Exciter Schematic
Diagram and Circuit Board Detail
Motorola No. PEPS-16953-G
2/24/78-UP

EXCITER TROUBLESHOOTING CHART


NOTE
CHECK POSITION READINGS WITH A MOTOROLA S-1056A THRU S-1059A PORTABLE TEST SET, OPTIONAL BUILT-IN-STATION METERING, OR EQUIVALENT
START
KEY XMTR
CHECK POSITION 2 READINGS FOR EACH FREQUENCY
BAD
CHECK CHANNEL ELEMENT CIRCUIT
GOOD
CHECK POSITION READING
BAD
CHECK BUFFER AMPLIFIER
GOOD
CHECK POSITION 4 READING
BAD
TRIPLER OR 1ST DOUBLER STAGE DEFECTIVE
GOOD
CHECK POSITION 5 READING
BAD
1ST OR 2ND DOUBLER STAGE DEFECTIVE
GOOD
CHECK POWER OUTPUT AT POWER AMPL METER POSITION 1
BAD
POWER AMP OR 2ND DOUBLER STAGE DEFECTIVE
GOOD
CHECK OUTPUT FREQ FOR EACH CHANNEL
BAD
ADJUST CHANNEL ELEMENT ON-FREQUENCY AND REALIGN EXCITER
GOOD
INJECT 1 VOLT 1000 Hz AUDIO AT MIC JACK CHECK POSITION 1 READING
BAD
IDC STAGES DEFECTIVE (Q401, Q402, Q403)
GOOD
CHECK DEVIATION FOR ±5 kHz
NONE
AUDIO AMPL OR MODULATOR STAGE DEFECTIVE
LOW OR HIGH
READJUST "IDC" POT
GOOD
INJECT 165 mV 1000 Hz AUDIO AT MIC JACK
CHECK DEVIATION FOR ±3.3 kHz
LOW
"IDC" OR AUDIO AMPL STAGE LOW GAIN
GOOD
EXCITER OK
TYPICAL STAGE CHECKOUT
1. ISOLATE POINT OF SIGNAL LOSS WITH RF VOLTMETER OR OSCILLOSCOPE.
2. MEASURE DC VOLTAGES TO ALL ELEMENTS OF SUSPECTED STAGE.
3. MAKE RESISTANCE MEASUREMENTS OF COMPONENTS IN CIRCUIT WHERE ABNORMAL VOLTAGES ARE FOUND.
DEPS-8369-O


SHOWN FROM SOLDER SIDE
Q404
Q405
Q406
Q401
Q408
Q407
SOLDER SIDE
COMPONENT SIDE


EXCITER
BOARD
SCHEMATIC LEGEND
TLD5321A-3 L=132-150.8 MHz
TLD5322A-4 H=150.8-174 MHz
SYMMETRICAL CLIPPER AND SPLATTER FILTER
EMITTER FOLLOWER
METER 1
METER 2
METER 3
METER 4
BUFFER AMPLIFIER
TRIPLER
EXCITER OUTPUT AMPLIFIER
Q401 M9647
Q404 M9571
Q405 M9534
Q406 M9550
Q407 M9967
+9.6V
CODE INPUT
"PL" TONE INPUT
MIC AUDIO
DELAYED KEYED A+
KEYED A+
A+
ENABLE
CODE
T4 SELECT
T3 SELECT
T2 SELECT
T1 SELECT
P403-9
P403-10
P403-11
P403-12
P403-5
P403-4
P403-6
P401
P902
TO ENCODER
TO TRANSMITTER INTERCONNECT BOARD
RF OUTPUT
KEYED A-
METERING SOCKET DETAIL (VIEWED FROM NON-COMPONENT SIDE OF BOARD)
PEPS-16713-

NOTES

401 TRANSMITTER FREQUENCY CALCULATION

$f_o = \frac{f_c}{12}$ $f_c = f_o 12$

WHERE:

f_o=CHANNEL ELEMENT FREQUENCY

f_c=CARRIER FREQUENCY

402 VOLTAGE MEASURED ACROSS R436

403 HIGH IMPEDANCE TRANSISTORIZED VOLTMETERS (11 MEGOHM) NOT RECOMMENDED

404 UNLESS OTHERWISE STATED, VOLTAGES MEASURED IN RESPECT TO CHASSIS GROUND

405 UNLESS OTHERWISE STATED CAPACITOR VALUES ARE IN PICOFARADS

406 JU401 REMOVED IN "PRIVATE-LINE" RADIOS

407 R401 REMOVED IN REMOTE CONTROL STATIONS

408 WHEN CODE INPUTS ARE APPLIED VIA P401-10, R405 MUST BE REMOVED FROM THE CIRCUIT

409 R404 AND R405 ARE FACTORY SELECTED SO THAT PRIVATE LINE DEVIATION FALLS BETWEEN 500 HZ AND 1000HZ LIMITS

PREVIOUS REVISIONS AND PARTS LIST
SHOWN ON BACK OF THIS DIAGRAM

TLD5320A Series Exciter Schematic
Diagram and Circuit Board Detail
Motorola No. PEPS-16953-G
2/24/78-UP

AF POWER AMP.
DOUBLER STAGE

90/100 W POWER AMPLIFIER BOARD

TLD 5730A SERIES

MODEL TABLE

MODEL	FREQUENCY RANGE
TLD5732A	132-150.8 MHz
TLD5733A	150.8-162 MHz
TLD5734A	162-174 MHz

TECHNICAL CHARACTERISTICS*

RF Power In	400 mW
Input Impedance	50 ohms
RF Power Out	90 W Continuous & Intermittent
	100 W Continuous
	110 W Intermittent
Output Impedance	50 ohms
Power Requirements	12.8 volts @20.5 amps

*All values are typical

1. DESCRIPTION

Motorola's "Micor" power amplifier boards provide the following features:

-A minimum of 110 W (intermittent duty) or 100 W (continuous duty) rf output.

-All circuitry except power transistors (and control stage transistor in continuous duty stations) contained on one double-sided circuit board.

-Power transistors mounted directly to (but electrically isolated from) the heat sink.

-RF connections made through two coaxial connections which plug directly into the input and output filter assemblies located below the heat sink shelf.

-DC power supplied via two feed-through capacitors that also provide filtering.

-Input, output and most other interstage matching (with the exception of a single fixed-tuned matching network between the controlled amplifier stage and the pre-driver stage) is accomplished by the use of rf transformers wound around ferrite cores. Only two tuning adjustments are required due to the relatively broadband matching characteristics of the ferrite transformers and the low inductance leads of the silicon opposed emitter transistors.

-One metering socket which is accessible from the component side of the circuit board allows four major test points to be monitored and permits measurement of the dc current drawn by the final amplifier stage.

90/110 W POWER AMPLIFIER

MOTOROLA INC.
Communications Division

service publications
1301 E. Algonquin Road, Schaumburg, IL 60196

PARTS LIST

LEGEND

[illegible]-150.8 MHz
[illegible] 50.8-174 MHz

TLD5321A,A[illegible] Exciter (132-150.8 MHz
TLD5322A,A1 Exciter (150.8-174 MHz) PL-3268-E

This parts list covers four models of the high band Exciter Board. Where differences exist a letter suffix L or H is added to the reference symbol to show the applicable unit.

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITOR, fixed: pF ±5%: 500 V unless otherwise stated
[illegible]	21-831125	100 ±10%: 300 V
[illegible]	21-82428B59	.01 uF +80-20%: 200 V
[illegible]		NOT USED
[illegible]	8-82905C11	22 uF ±10%: 50 V
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible] 410	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible] 2, 413	[illegible] E10	[illegible]
414, 415	21-831125	100 ±10[illegible]
416, 417		[illegible]
C418 thru 421	23-84762H06	[illegible]
C422	21-82372C04	[illegible]
[illegible]	21-83596E10	[illegible]
[illegible]	21-82372C04	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	21-82428B59	[illegible]
[illegible]	21-84494B07	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	21-83406D54	[illegible]
[illegible]	21-84494B16	[illegible]
[illegible]	21-84494B13	[illegible]
[illegible]	[illegible]84494B13	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]		[illegible]
[illegible]	21-[illegible]28B59	.01 uF +80-20%: 200 V
[illegible]	21-83596E13	.001 uF ±10%: 100 V
[illegible]	21-84494B[illegible]	51
[illegible]	21-84494[illegible]	[illegible]
[illegible]	21-8614	1. ±[illegible]
[illegible]	21-852322	[illegible]
[illegible]	21-861601	130 ±3%
[illegible]	21-84494B10	1[illegible]
[illegible]	868681	47
[illegible]	21-82428B59	.01 uF +80-20%: 200 V
[illegible]	21-84493B27	51: 200 V
[illegible]	21-84494B24	[illegible]
[illegible]	[illegible]406D91	4[illegible]
[illegible]	21-84494B30	34
[illegible]	21-82450B0[illegible]	0.75 ±10%
[illegible]	21-83596E13	.001 uF ±10%: 100 V
[illegible]	21-83406D92	3[illegible]
[illegible]	[illegible]406D5[illegible]	24
[illegible]	[illegible]-84493B31	[illegible]: 200 V
[illegible]	21-84494B28	43
[illegible]	21-83596E13	.001 uF ±10%: 100 V
[illegible]	21-82428B59	.01 uF +80-20%: 200 V
[illegible]	[illegible]06D93	[illegible]
[illegible]	21-83406D90	11
[illegible]	[illegible]	20
[illegible]	21-83406D5[illegible]	18
[illegible]	21-82450B0[illegible]	0.75 ±10%
[illegible]	21-83596E13	.001 uF ±10%: 100 V
[illegible]	21-83406D90	11
[illegible]	21-83406D70	8 ±0.5 [illegible]
[illegible]	[illegible]	10 ±0.5 pF
[illegible]	21-83596E13	.001 uF ±10%: 100 V
[illegible]	[illegible]	24: NPO
[illegible]	[illegible]	220 ±20%
[illegible]	[illegible]-84494B07	150
[illegible]	21-84494B06	120
[illegible]	21-83596E13	.001 uF ±10%: 100 V
[illegible]	21-82355B[illegible]	[illegible]
[illegible]	21-8242[illegible]	[illegible] uF +80-20%: 200 V
		DIODE: (SEE NOTE)
CR401	48-863030	germanium
CR402, 403		NOT USED
CR404, 405	48-82139G01	germanium
		COIL, rf:
E401	24-84392B06	40 turns on 820 ohm resistor
E402L	24-84392B13	15 turns on 560 ohm resistor
E402H	24-84392B05	9 turns on 560 ohm resistor
		CONNECTOR, receptacle:
J401		NOT USED
J402	9-84207B01	7 contacts
		COIL, rf:
L401	24-84389B02	18-2/3 turns; coded Black
L402	24-84389B01	18-1/2 turns; coded Yellow
L403	24-84389B06	8-2/3 turns; coded Green
L404	24-84389B05	8-1/2 turns; coded Red
L405, 406	24-84972A09	6-1/2 turns; coded Yellow
L407, 408	24-84972A11	3-1/2 turns; coded Green
L409		NOT USED
L410	24-80900A61	0.62 mH
L411, 412	24-82835G08	2.6 uH, coded Red-Blue-Gold
L413	24-84923C01	1-1/2 turns
		CONNECTOR, plug:
P401		part of printed circuit board
P402	28-84282D01	phono
P403, 902		part of printed circuit board
		TRANSISTOR: (SEE NOTE)
Q401	48-869642	NPN; type M9642
Q402, 403		NOT USED
Q404	48-869571	PNP; type M9571
Q40[illegible]	48-869534	NPN; type M9534
[illegible]	48-869390	[illegible]; type M9390
Q407, 408	48-869867	NPN; type M9867
		RESISTOR, fixed: ±10%: 1/4 W unless otherwise stated
R401	6-124C43	560
R402	6-124A37	330 ±5%
R403	6-124A79	18k ±5%
R404	6-124A87 or 6-124A89	39k ±5% 47k ±5% (factory selected for DPL models only)
R405	6-124A85 or 6-124A89	33k ±5% 47k ±5% (factory selected for PL models only)
R406	6-124A99	120k ±5%
R407	6-124B04	180k ±5%
R408	6-124C73	10k
R409	6-124C83	27k
R410	18-83083G24	variable: 25k ±30%
R411 thru 418		NOT USED
R419 thru 422	6-124A79	18k ±5%
R423	[illegible]	2.2k
R424	6-124C85	33k
R425	6-124C51	1.2k
R426	6-124C47	820
R427		NOT USED
R428	6-124C85	33k
R429	6-124C57	2.2k
R430	6-124C35	270
R431	6-124C89	47k
R432	6-124C63	3.9k
R433		NOT USED
R434	6-124C39	390
R435L	6-124C09	22
R435H	6-124C15	39
R436	6-125C05	15 1/2 W
R437	6-124C97	100k
R438	6-124C49	1k
R439L	6-124C49	1k
R439H	6-124C47	820
		SYMMETRICAL CLIPPER AND SPLATTER FILTER
U401	1-80763B05	potted unit

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		NON-REFERENCED ITEMS
	14-861196	INSULATOR, transistor: 2 req'd. (used with Q407 & Q408)
	26-83379H01	HEAT SINK (used with Q408)
	26-84598A01	SHIELD, coil; 4 req'd. (used with L405 thru L408)
	26-84598A02	SHIELD, coil; 4 req'd. (used with L401 thru L404)
	42-84284B01	RETAINER; 4 req'd.
	3-138162	SCREW, tapping: Phillips round hd., 4-40 x 3/8"; 4 req'd. (used for mounting Retainers)
	55-84300B01	HANDLE
	30-83794C01	CABLE, coaxial; 6" req'd. (used with P402)
	29-84028H01	TERMINAL, pin; 19 req'd.
	29-84028H02	TERMINAL, pin; 12 req'd.
	29-855943	TERMINAL, pin; 16 req'd.
	39-10184A10	CONTACT, terminal; 10 req'd.

NOTE: For optimum performance, replacement diodes and transistors must be ordered by Motorola part numbers.

REVISIONS

PEPS-16953-F

CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
TLD5321A-1	R424	From 6-124C89, 47k To 6-124C85, 33k	Meter 2 J402-2
	R428	From 6-124C87, 39k To 6-124C85, 33k	
	R43	From 6-124C93, 68k To 6-124C89, 47k	Meter 4 J402-4
TLD5321A-2 TLD5322A-2	R428	From 6-124C85, 33k To 6-124C87, 39k	Meter 2 J402-2
TLD5321A-3 TLD5322A-3	C439	From 21-864518, 1 pF To 21-861453, 1.5 pF	Meter 4 J402-4
	C440H	From 21-83406D87, 43 pF To 21-861601, 130 pF	
	C441H	From 21-84494B46, 180 pF To 21-868681, 47 pF	
TLD5322A-4	R439H	From 6-124C41, 470 To 6-124C47, 820	Q408 Collector

90/100 W POWER AMPLIFIER BOARD

TLD 5730A SERIES

MODEL TABLE

MODEL	FREQUENCY RANGE
TLD5732A	132-150.8 MHz
TLD5733A	150.8-162 MHz
TLD5734A	162-174 MHz

TECHNICAL CHARACTERISTICS*

RF Power In	400 mW
Input Impedance	50 ohms
RF Power Out	90 W Continuous & Intermittent
	100 W Continuous
	110 W Intermittent
Output Impedance	50 ohms
Power Requirements	12.8 volts @20.5 amps

*All values are typical

1. DESCRIPTION

Motorola's "Micor" power amplifier boards provide the following features:

-A minimum of 110 W (intermittent duty) or 100 W (continuous duty) rf output.

-All circuitry except power transistors (and control stage transistor in continuous duty stations) contained on one double-sided circuit board.

-Power transistors mounted directly to (but electrically isolated from) the heat sink.

-RF connections made through two coaxial connections which plug directly into the input and output filter assemblies located below the heat sink shelf.

-DC power supplied via two feed-through capacitors that also provide filtering.

-Input, output and most other interstage matching (with the exception of a single fixed-tuned matching network between the controlled amplifier stage and the pre-driver stage) is accomplished by the use of rf transformers wound around ferrite cores. Only two tuning adjustments are required due to the relatively broadband matching characteristics of the ferrite transformers and the low inductance leads of the silicon opposed emitter transistors.

-One metering socket which is accessible from the component side of the circuit board allows four major test points to be monitored and permits measurement of the dc current drawn by the final amplifier stage.

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Communications Division

service publications
1301 E. Algonquin Road, Schaumburg, IL 60196

-Due to the heat sink mounting requirements for this board, servicing is accomplished from the component side of the board.

-Diode protection against reverse polarity voltage (board mounted diode).

-Output protection provided by a control stage transistor driven by power control circuit. (Controls gain of the first stage). In intermittent duty stations, a single-wire connection provides interconnection between power control and PA circuitry. In continuous duty stations three wire connections provide the interconnection.

2. FUNCTIONAL OPERATION

Refer to the block diagram, Figure 1, and the schematic diagram. This series of power amplifiers requires a 400 mW rf input from the exciter board. This input is passed through a bandpass filter assembly and a ferrite step-down transformer (to match the input impedance to the first stage) to the gain-controlled amplifier stage. The external power control circuit which drives the control stage transistor determines the gain of this stage. The power control circuit monitors the output of the final stages of the power amplifier, the load condition and the heat sink temperature.

The output of the gain-controlled amplifier is passed through a fixed-tuned broadband matching network and applied to the pre-driver stage. A second ferrite transformer is utilized to match the single-ended output of the pre-driver stage to the input of the push-pull driver stage. The output of the driver stage is split by a pair of transformers to drive each of the push-pull final power amplifier stages. The output from each final stage is stepped up in impedance by ferrite transformers and paralleled to provide the 50-ohm output impedance to match the input impedance of the harmonic filter.

Pin 1 of the metering receptacle provides a means of checking the incoming signal from the exciter. Pin 2 permits observation of the drive output of the first stage and an indication of the operation of the pre-driver stage. Pins 3 and 4 reflect the output drive signal and operation of the two push-pull power amplifier stages. Reference position A on a Motorola Portable Test Set uses pin 7 of the metering socket as an A+ reference against which the outputs of pins 1, 2, 3, and 4 are checked. Switch the test set to reference position B which uses pin 6 as a reference and then switch to meter position 5. This provides a reading across a calibrated resistor through which the current is drawn by the final amplifier stages.

3. MAINTENANCE

a. General

NOTE

Because of the complexity involved and time required to remove the PA board, compared to plug-in boards, it is not recommended that the PA board be removed. Proper troubleshooting techniques will usually locate defective components "on the spot".

This section of the manual provides the maintenance shop procedures for the PA board. It assumes that preliminary tests have already localized the trouble to the PA board. These procedures include measurements with optional built-in metering or a Motorola portable test set, a vom, a complete set of performance tests, and extensive troubleshooting procedures.

CAUTION

The PA board must be installed in the transmitter for testing to provide the necessary power, ground, control, heat sinking and signal connections.

b. Recommended Test Equipment

The following test equipment is the minimum required for troubleshooting and adjusting the PA. All such equipment is battery operated which permits testing to be performed in the field where no commercial power is available for bench type test equipment. Option built-in station metering when incorporated takes the place of the portable test set.

(1) Motorola S1056B through S1059B Portable Test Set and Model TEK-37 or TEK-37A Adapter Cable. The portable test set is required for checking each stage for proper operation.

(2) A Motorola Solid-State DC Multimeter or a 20,000 ohm-per-volt multimeter should be used, however a low impedance multimeter is acceptable for dc voltage measurements only.

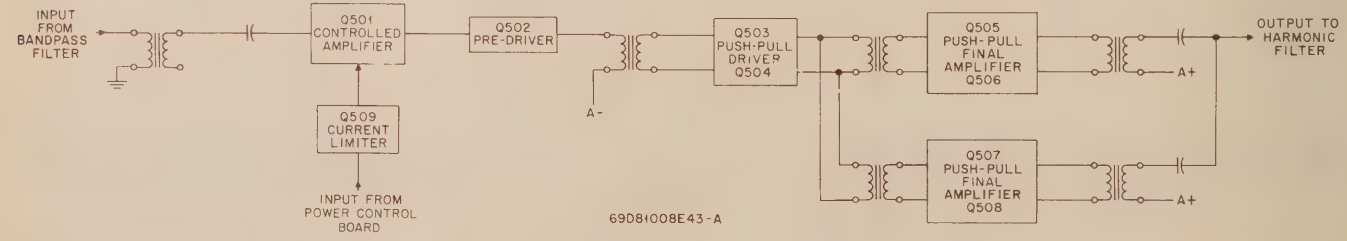

INPUT FROM BANDPASS FILTER
Q501 CONTROLLED AMPLIFIER
Q502 PRE-DRIVER
Q503 PUSH-PULL DRIVER Q504
Q505 PUSH-PULL FINAL AMPLIFIER Q506
OUTPUT TO HARMONIC FILTER
A+
Q509 CURRENT LIMITER
A-
INPUT FROM POWER CONTROL BOARD
Q507 PUSH-PULL FINAL AMPLIFIER Q508
A+
69D81008E43-A

Figure 1. Block Diagram

(3) Motorola T1013A RF Load Resistor (dummy load) or equivalent.

c. Test Set Metering

The PA is equipped with a metering receptacle which allows five major test points to be measured. PA metering can be made at each of the five test points by merely rotating a selector switch on the built-in station meter kit or on the test set. A failure in almost any portion of the PA will produce a low or zero meter reading for one or more of the test points. Improper alignment will also cause improper meter readings.

(1) Using the Optional Built-In Station Meter

This procedure is valid only with intermittent duty station. Continuous duty stations with built-in station metering measure only exciter output (PA input), PA current, and PA voltage.

a. The entire transmitter is necessary for testing PA boards including the power control board for proper control.

b. The output of the station must be terminated in one of three types of loads:

--The antenna load.

--A dummy load such as Motorola's T1013A RF Load Resistor.

--An RF Wattmeter.

NOTE

A dummy load is preferred to the antenna to eliminate the possibility of shutback by the power control board due to a defective antenna.

c. Turn the station ON.

d. With the meter selector switch set to position 1, key the transmitter and observe the meter. Unkey the transmitter.

Set the selector switch to position 2, 3, and 4 keying the transmitter and observing the meter reading for each. On multi-frequency stations, repeat the readings for each frequency. An analysis of the meter readings for determining whether each circuit is good or bad follows the "Using the Portable Test Set" paragraphs.

(2) Using the Portable Test Set

To make the measurements, the portable test set must be connected to the station as follows.

a. Set the function selector switch of the portable test set to the XMTR position.

b. Set the meter reversing switch of the test set to the METER REV position, the selector switch to position 1, and REF switch to position A.

c. Connect the 20-pin meter cable plug to the test set. When the test set is not in use, disconnect the 20-pin plug to conserve battery life. The plug acts as an on-off switch completing the battery circuit.

d. Connect the red "control" plug of the adapter cable to the control receptacle on the local or remote control board. Connect the white "metering" plug of the adapter cable to the receptacle on the PA circuit board.

e. The entire transmitter is necessary for testing PA boards including the power control board for proper control.

f. The output of the station must be terminated in one of three types of loads:

--The antenna load.

--A dummy load such as Motorola's T1013A RF Load Resistor.

--An RF Wattmeter.

NOTE

A dummy load is preferred to the antenna to eliminate the possibility of shutback by the power control board due to a defective antenna.

g. Turn the station ON.

h. Key the transmitter with the XMTR ON button on the test set. Observe the meter. Unkey the transmitter.

i. Set the selector switch to positions 2, 3, & 4; then switch to reference position B and meter position 5 respectively, keying the transmitter and observing the meter reading for each. On multi-frequency stations, repeat the readings for each frequency. An analysis of the meter readings for determining whether each circuit is good or bad follows.

Each time maintenance is performed on the PA the readings should be compared with the previous set of readings. Any degradation of performance will quickly be noted. Often, a lower reading may indicate an impending failure and corrective action may be taken before the circuit fails entirely.

d. Performance Tests

(1) No performance test of the power amplifier is required other than rf power output from the station as a whole. Before checking power output:

(a) The exciter board should be known to be operating normally.

(b) The power control board should be known to be functioning normally.

(2) Key the transmitter and observe power out, which should be 90, 100, or 110 watts, depending upon licensing.

MINIMUM PA METER READINGS

SELECTOR SWITCH POSITION	REFERENCE SWITCH POSITION PORTABLE TEST SET ONLY	MINIMUM METER READINGS	CIRCUIT METERED	IF LOW, DEFECTIVE CIRCUIT IS: (SEE TROUBLESHOOTING CHARTS)
1	A	15 uA	Exciter Output (input to Controlled Amplifier Q501)	Exciter output, input circuitry of controlled amplifier stage Q501
2	A	5 uA	Input of Predriver Stage (Q502)	Output of controlled amplifier stage input circuitry of predriver stage
3	A	12 uA (100 W/ 110 W) 10 uA (90 W)	Input of Final Amplifier Stage Q505, Q506	Input of Q505, Q506 stages, output of driver stage (Q502, Q503), output of predriver stage Q502
4	A	12 uA (100 W/ 110 W) 10 uA (90 W)	Input of Final Amplifier Stage Q507, Q508	Input of Q507, Q508 stage output of driver stage Q502, Q503. Output of predriver stage Q502
5 (or 2 SEE NOTE)	B	21 uA min. 27 uA max. 90 W 23 uA min. 100 W 37 uA max. 110 W	Total Current in Final Amplifier Stages Q505, Q506, Q507, Q508	Output of final amplifier stages Q505-Q508, power control board antenna switch, antenna.
6 (or 3 SEE NOTE)	B	12 V (0-30 V scale)	Final Amplifier Stage	Final amplifier stage A+ or A- input

(3) If necessary, adjust POWER SET control for rated power output.

CAUTION

The PA shield must always be in place during operation of the radio set and should be kept in place as much as possible while testing and troubleshooting. The circuit board must always be secured in place with all mounting screws. The transistors (including the control stage transistor) must be secured in place to provide proper heat sinking, and the feedthrough connectors must be soldered in place to provide dc power and good rf grounding.

4. TROUBLESHOOTING

If a problem has been localized to the PA decks, several checks can be made prior to extensive troubleshooting.

a. Visual

Visually check for obvious physical defects such as broken leads, broken plating, broken or disconnected components or overheated parts. Before any attempt is made to change parts, the circuit should be checked to insure that the problem causing the original failure has been identified and corrected, otherwise damage to the new part may occur.

b. Voltage Checks

Check for A+ and A- at the feedthrough connections and for proper voltages at the collectors of each transistor. Certain defects such as broken plating, broken leads etc. may not be obvious to a visual inspection.

c. Troubleshooting

If test set readings are abnormal or tests indicate subnormal performance, a logical troubleshooting procedure is required to isolate the defective component efficiently. The accompanying troubleshooting chart summarize these results in a logical sequence. A few voltage and resistance checks in the suspected circuit should readily isolate the defective component. Note that all power for the circuits in the PA is from A- referenced to A+ (not to chassis ground, this feature allows operation from positive or negative ground power sources when an optional positive ground converter is used).

CAUTION

Due to the voltage requirements of P-N-P transistors, all "rf ground" plating is A+ and is "hot" with respect to chassis ground in negative ground applications. Because of this, caution should be used to prevent connection of "ground" plating on the PA board to chassis ground, either directly or by the use of test equipment ground leads. If ac operated test equipment is used, the ground lead must not be electrically connected to ac line ground.

The schematic diagram of the PA board contains the voltage readings required for troubleshooting. The readings are typical for normal operating conditions at rated power output for the radio. Refer to the troubleshooting chart, and the schematic when a defect is suspected in the PA board.

5. PA REPAIR NOTES

a. Resistance Measurement of Transistors in Push-Pull Pairs

Due to the fact that transistors in push-pull pairs are dc connected at both base and emitter, BOTH devices should be measured when a defect in the pair is suspected.

b. Transistor Removal Procedure

(1) Unscrew both mounting screws from the base of the transistors. The nuts (for the mounting screws) on the reverse side of the shelf are captivated and will not fall out.

(2) Remove excess solder from around transistor tabs with a vacuum bulb type de-soldering device.

(3) Gently lift each lead, one at a time while applying heat.

(4) When all four leads are loose from the board carefully lift out the transistor.

c. Transistor Installation Procedure

(1) Pre-tin underside of each transistor lead.

(2) Apply a light coat of Wakefield Thermal Compound to the underside of the transistor mounting base and to the heat sink.

(3) Install the transistor making sure that all collector leads face the proper direction. Refer to the circuit board detail.

(4) Screw down the two mounting screws securely.

(5) Solder each transistor lead one at a time to the circuit board. The use of a generous amount of solder will insure a good contact of the entire tab to the board. Use care that solder does not bridge to other plating or that solder does not flow into the cutout in the circuit board.

d. Procedures for Resistance Measurements of Transistors

(1) Set ohmmeter to RX1, RX10 or RX100 scale (preferably RX10 if available).

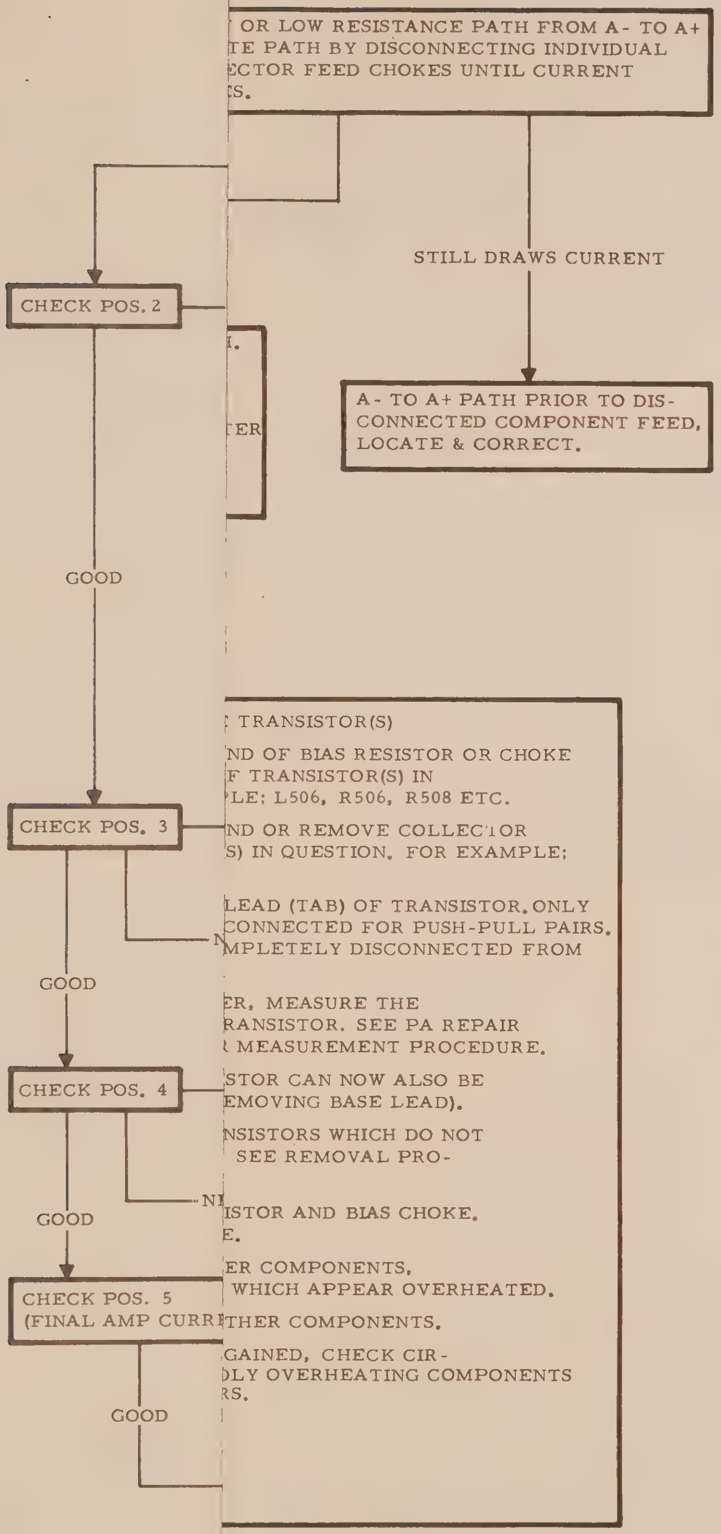
(2) Measure the resistance from lead to lead as described:

(a) With the positive probe on the base, no indication (very high impedance) should be observed when the negative probe is touched to the collector or emitter. (Reverse drop measurement).

(b) With the negative probe on the base, a relatively low impedance should be observed when touching the positive probe to the collector and emitter. (Forward drop measurement.)

(c) No indication should be observed from collector to emitter regardless of the polarity of the ohmmeter probes.

Should any indication be observed in measurements (a) or (c), the transistor is defective and should be replaced.


OR LOW RESISTANCE PATH FROM A- TO A+
TE PATH BY DISCONNECTING INDIVIDUAL
ECTOR FEED CHOKES UNTIL CURRENT
S.
STILL DRAWS CURRENT
A- TO A+ PATH PRIOR TO DIS-
CONNECTED COMPONENT FEED,
LOCATE & CORRECT.
CHECK POS. 2
I.
ER
GOOD
TRANSISTOR(S)
ND OF BIAS RESISTOR OR CHOKE
F TRANSISTOR(S) IN
LE; L506, R506, R508 ETC.
CHECK POS. 3
ND OR REMOVE COLLECTOR
S) IN QUESTION. FOR EXAMPLE;
LEAD (TAB) OF TRANSISTOR. ONLY
CONNECTED FOR PUSH-PULL PAIRS.
N
MPLETELY DISCONNECTED FROM
GOOD
ER, MEASURE THE
RANSISTOR. SEE PA REPAIR
MEASUREMENT PROCEDURE.
CHECK POS. 4
STOR CAN NOW ALSO BE
EMOVING BASE LEAD).
NSISTORS WHICH DO NOT
SEE REMOVAL PRO-
NI
GOOD
ISTOR AND BIAS CHOKE.
E.
ER COMPONENTS,
WHICH APPEAR OVERHEATED.
CHECK POS. 5
(FINAL AMP CURR
THER COMPONENTS.
GAINED, CHECK CIR-
LY OVERHEATING COMPONENTS
RS.
GOOD

(3) Install the transistor making sure that all collector leads face the proper direction. Refer to the circuit board detail.

(4) Screw down the two mounting screws securely.

(5) Solder each transistor lead one at a time to the circuit board. The use of a generous amount of solder will insure a good contact of the entire tab to the board. Use care that solder does not bridge to other plating or that solder does not flow into the cutout in the circuit board.

d. Procedures for Resistance Measurements of Transistors

(1) Set ohmmeter to RX1, RX10 or RX100 scale (preferably RX10 if available).

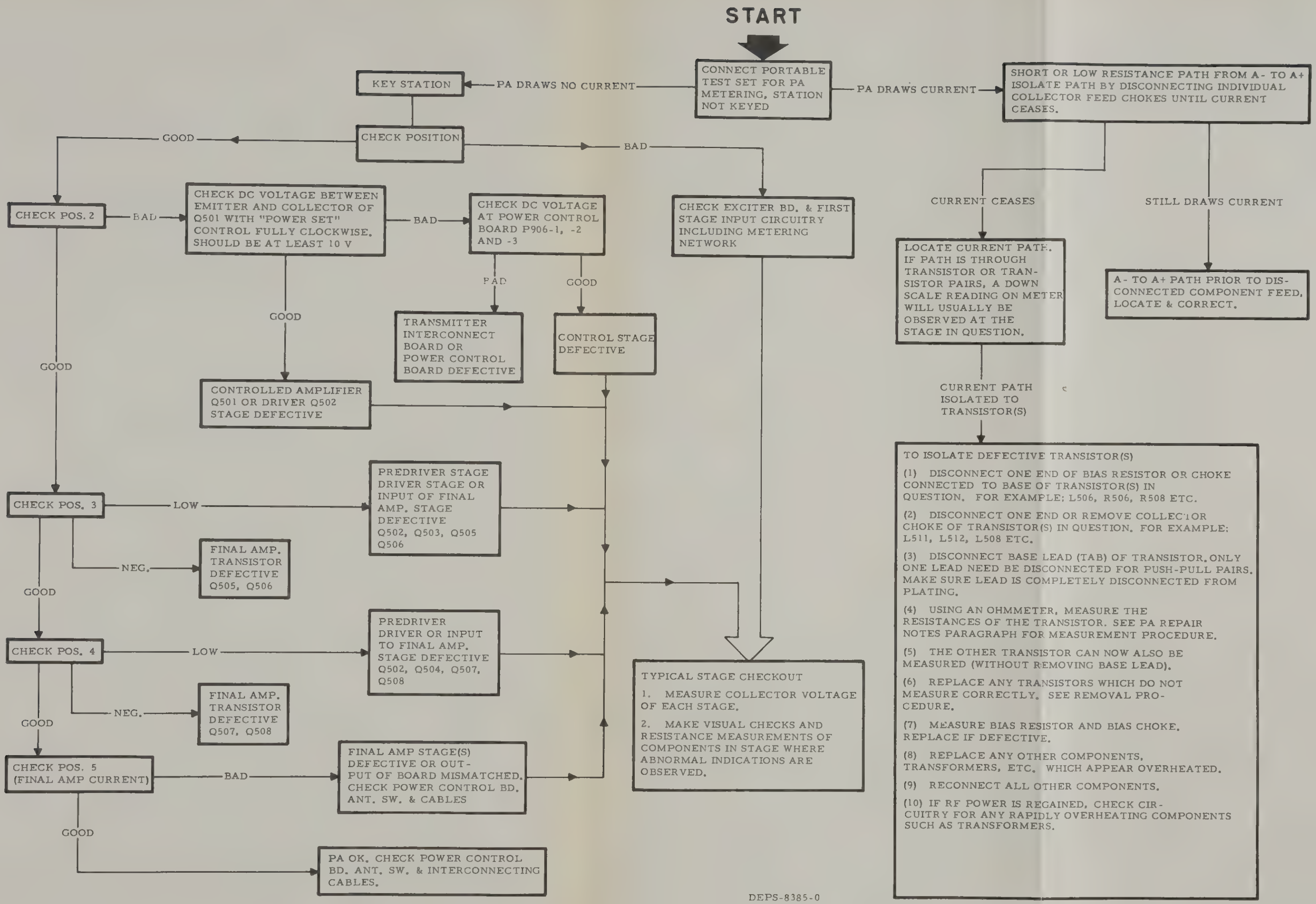
(2) Measure the resistance from lead to lead as described:

(a) With the positive probe on the base, no indication (very high impedance) should be observed when the negative probe is touched to the collector or emitter. (Reverse drop measurement).

(b) With the negative probe on the base, a relatively low impedance should be observed when touching the positive probe to the collector and emitter. (Forward drop measurement.)

(c) No indication should be observed from collector to emitter regardless of the polarity of the ohmmeter probes.

Should any indication be observed in measurements (a) or (c), the transistor is defective and should be replaced.


START
CONNECT PORTABLE TEST SET FOR PA METERING, STATION NOT KEYED
PA DRAWS NO CURRENT
KEY STATION
PA DRAWS CURRENT
SHORT OR LOW RESISTANCE PATH FROM A- TO A+ ISOLATE PATH BY DISCONNECTING INDIVIDUAL COLLECTOR FEED CHOKES UNTIL CURRENT CEASES.
CHECK POSITION
GOOD
BAD
CHECK POS. 2
BAD
CHECK DC VOLTAGE BETWEEN EMITTER AND COLLECTOR OF Q501 WITH "POWER SET" CONTROL FULLY CLOCKWISE. SHOULD BE AT LEAST 10 V
BAD
CHECK DC VOLTAGE AT POWER CONTROL BOARD P906-1, -2 AND -3
CHECK EXCITER BD. & FIRST STAGE INPUT CIRCUITRY INCLUDING METERING NETWORK
CURRENT CEASES
STILL DRAWS CURRENT
LOCATE CURRENT PATH. IF PATH IS THROUGH TRANSISTOR OR TRANSISTOR PAIRS, A DOWN SCALE READING ON METER WILL USUALLY BE OBSERVED AT THE STAGE IN QUESTION.
A- TO A+ PATH PRIOR TO DISCONNECTED COMPONENT FEED, LOCATE & CORRECT.
BAD
GOOD
GOOD
TRANSMITTER INTERCONNECT BOARD OR POWER CONTROL BOARD DEFECTIVE
CONTROL STAGE DEFECTIVE
GOOD
CONTROLLED AMPLIFIER Q501 OR DRIVER Q502 STAGE DEFECTIVE
CURRENT PATH ISOLATED TO TRANSISTOR(S)
TO ISOLATE DEFECTIVE TRANSISTOR(S)
(1) DISCONNECT ONE END OF BIAS RESISTOR OR CHOKE CONNECTED TO BASE OF TRANSISTOR(S) IN QUESTION. FOR EXAMPLE: L506, R506, R508 ETC.
(2) DISCONNECT ONE END OR REMOVE COLLECTOR CHOKE OF TRANSISTOR(S) IN QUESTION. FOR EXAMPLE: L511, L512, L508 ETC.
(3) DISCONNECT BASE LEAD (TAB) OF TRANSISTOR. ONLY ONE LEAD NEED BE DISCONNECTED FOR PUSH-PULL PAIRS. MAKE SURE LEAD IS COMPLETELY DISCONNECTED FROM PLATING.
(4) USING AN OHMMETER, MEASURE THE RESISTANCES OF THE TRANSISTOR. SEE PA REPAIR NOTES PARAGRAPH FOR MEASUREMENT PROCEDURE.
(5) THE OTHER TRANSISTOR CAN NOW ALSO BE MEASURED (WITHOUT REMOVING BASE LEAD).
(6) REPLACE ANY TRANSISTORS WHICH DO NOT MEASURE CORRECTLY. SEE REMOVAL PROCEDURE.
(7) MEASURE BIAS RESISTOR AND BIAS CHOKE. REPLACE IF DEFECTIVE.
(8) REPLACE ANY OTHER COMPONENTS, TRANSFORMERS, ETC. WHICH APPEAR OVERHEATED.
(9) RECONNECT ALL OTHER COMPONENTS.
(10) IF RF POWER IS REGAINED, CHECK CIRCUITRY FOR ANY RAPIDLY OVERHEATING COMPONENTS SUCH AS TRANSFORMERS.
CHECK POS. 3
LOW
PREDRIVER STAGE DRIVER STAGE OR INPUT OF FINAL AMP. STAGE DEFECTIVE Q502, Q503, Q505 Q506
NEG.
FINAL AMP. TRANSISTOR DEFECTIVE Q505, Q506
GOOD
CHECK POS. 4
LOW
PREDRIVER DRIVER OR INPUT TO FINAL AMP. STAGE DEFECTIVE Q502, Q504, Q507, Q508
NEG.
FINAL AMP. TRANSISTOR DEFECTIVE Q507, Q508
TYPICAL STAGE CHECKOUT
1. MEASURE COLLECTOR VOLTAGE OF EACH STAGE.
2. MAKE VISUAL CHECKS AND RESISTANCE MEASUREMENTS OF COMPONENTS IN STAGE WHERE ABNORMAL INDICATIONS ARE OBSERVED.
GOOD
CHECK POS. 5 (FINAL AMP CURRENT)
BAD
FINAL AMP STAGE(S) DEFECTIVE OR OUTPUT OF BOARD MISMATCHED. CHECK POWER CONTROL BD. ANT. SW. & CABLES
GOOD
PA OK. CHECK POWER CONTROL BD. ANT. SW. & INTERCONNECTING CABLES.
DEPS-8385-0

POWER AMPLIFIER ALIGNMENT PROCEDURE

RTABLE TEST SET		OPTIONAL BUILT-IN METERING			
ST SET TCH SITION	ADAPTER CABLE SWITCH POSITION	METER SELECTOR SWITCH	POLARITY SWITCH	ADJUST	STAGE AND PROCEDURE
	--	--	--	--	Align the exciter.
	--	--	--	--	For complete power amplifier tune-up, proceed to step 3. To check alignment, go to step 7.
	--	--	--	C501, C502	PA PRE-ALIGNMENT - Set C501 fully clockwise and C502 plates fully meshed.
tmeter	METER REV. REF A	PWR CONT 1	FWD	POWER SET	OUTPUT - Without exceeding rated power output on wattmeter or calibration label value on meter 1, adjust the POWER SET control for rated power or until no further increase in power output is observed. If PA Meter 5 is greater than 25 uA, adjust POWER SET counterclockwise (if less than 15 uA, adjust POWER SET clockwise) until meter reading is between 15 and 25 uA.
	METER REV. REF B	PWR CONT 5	FWD	C501, C502	PA DRIVER OUTPUT - Tune C501, then C502, for minumum meter 5 reading.
tmeter	METER REV. REF A	PWR CONT 1	FWD	POWER SET	OUTPUT - Adjust the POWER SET control for rated power output and repeat step 6 (if rated power cannot be attained, repeat steps 4 and 5).
	METER REV. REF B	PWR CONT 5	FWD		Check meter reading, it must not exceed 50 uA.
	METER REV. REF B	PWR AMP 5	REV	--	FINAL COLLECTOR CURRENT - The relationship between the meter reading and the actual current being measured is 50 uA = 25 A. Therefore, to measure the final collector current (I_c) in amperes, take 1/2 the meter reading.
	METER REV. REF B	25 V (Use voltage probes)	FWD	--	FINAL COLLECTOR VOLTAGE - Measure the final collector voltage (V_c). V_c is the meter 6 reading (0-30 V scale on portable test set, 25 V full scale on built-in metering.
	--	--	--	--	Determine final input power (P_{in}). P_{in} equals $V_c \times I_c$. P_{in} should be less than: 180 watts for 90-watt models; 200 watts for 100-watt continuous duty models and 110-watt intermittent duty models.

NOTE

Alignment may be performed using a Motorola S1056B thru S1059B Portable Test Set or optional built-in station metering. The OSC. & METER REV. SWITCH column refers to portable test set usage -- polarity is automatically reversed as required when built-in station metering is used.

EXCERPTS FROM FCC REGULATIONS

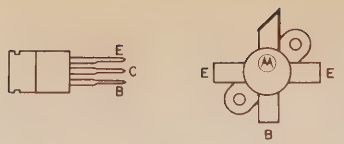
FCC Regulations state that:

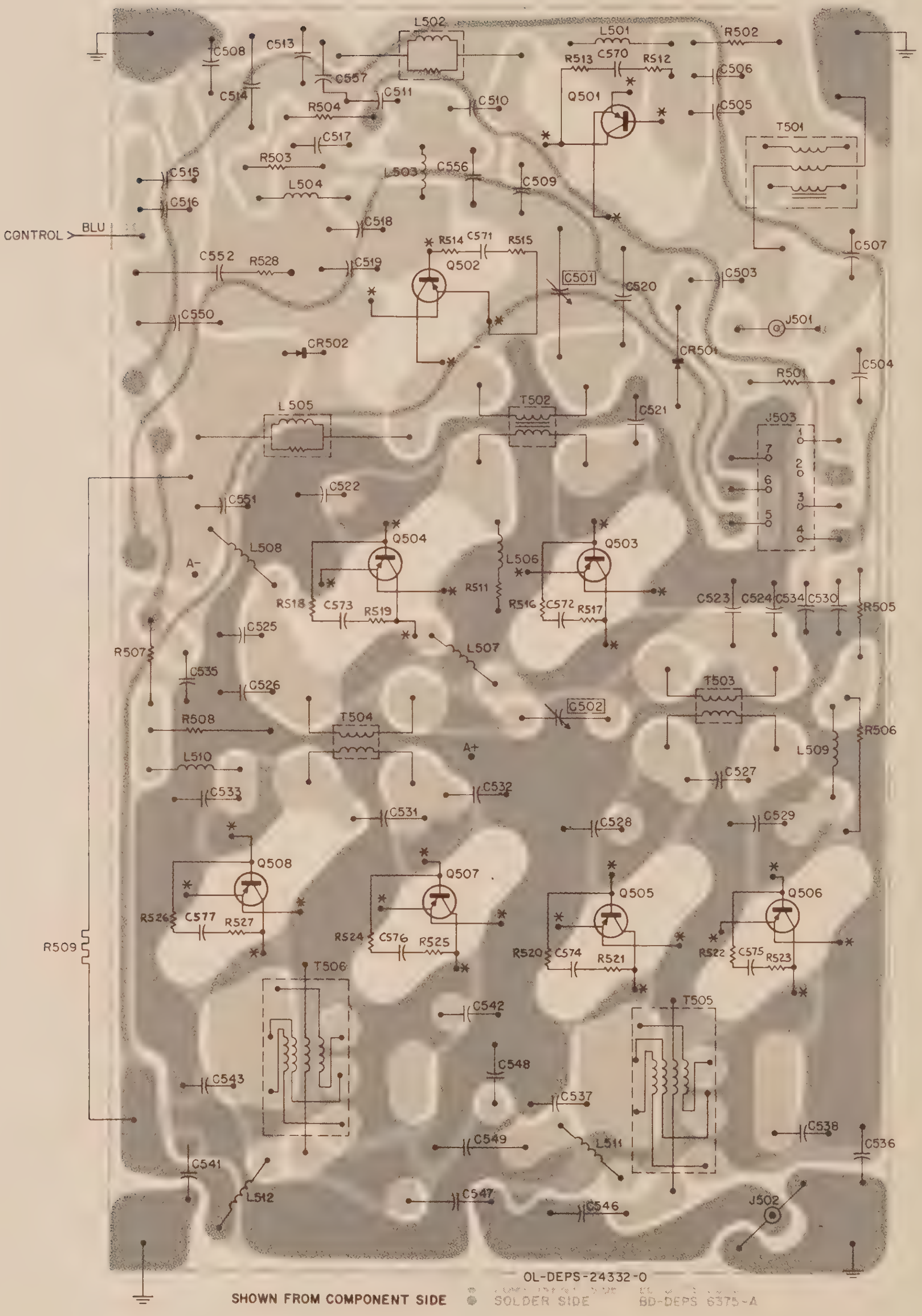
1. Radio transmitters may be tuned or adjusted only by persons holding a first or second class commercial radiotelephone operator's license or by personnel working directly under their immediate supervision.
2. The power input to the final radio frequency stage shall not exceed the maximum figure specified on the current station authorization. This power input shall be measured and the results recorded:
    a. When the transmitter is initially installed.
    b. When any change is made in the transmitter which may increase the power input.
    c. At intervals not to exceed one year.
3. Frequency and deviation of a transmitter must be checked:
    a. When it is initially installed.
    b. When any change is made in the transmitter which may affect the carrier frequency or modulation characteristics.
    c. At intervals not to exceed one year.

POWER AMPLIFIER ALIGNMENT PROCEDURE

		PORTABLE TEST SET		OPTIONAL BUILT-IN METERING			
STEP	METERING PLUG LOCATION	TEST SET SWITCH POSITION	ADAPTER CABLE SWITCH POSITION	METER SELECTOR SWITCH	POLARITY SWITCH	ADJUST	STAGE AND PROCEDURE
1	--	--	--	--	--	--	Align the exciter.
2	--	--	--	--	--	--	For complete power amplifier tune-up, proceed to step 3. To check alignment, go to step 7.
3	--	--	--	--	--	C501, C502	PA PRE-ALIGNMENT - Set C501 fully clockwise and C502 plates fully meshed.
4	POWER CONTROL BOARD	Wattmeter or 1	METER REV. REF A	PWR CONT 1	FWD	POWER SET	OUTPUT - Without exceeding rated power output on wattmeter or calibration label value on meter 1, adjust the POWER SET control for rated power or until no further increase in power output is observed. If PA Meter 5 is greater than 25 uA, adjust POWER SET counterclockwise (if less than 15 uA, adjust POWER SET clockwise) until meter reading is between 15 and 25 uA.
5	POWER CONTROL BOARD	5	METER REV. REF B	PWR CONT 5	FWD	C501, C502	PA DRIVER OUTPUT - Tune C501, then C502, for minumum meter 5 reading.
6	POWER CONTROL BOARD	Wattmeter or 1	METER REV. REF A	PWR CONT 1	FWD	POWER SET	OUTPUT - Adjust the POWER SET control for rated power output and repeat step 6 (if rated power cannot be attained, repeat steps 4 and 5).
			METER REV. REF B	PWR CONT 5	FWD		Check meter reading, it must not exceed 50 uA.
7	PA	5	METER REV. REF B	PWR AMP 5	REV	--	FINAL COLLECTOR CURRENT - The relationship between the meter reading and the actual current being measured is 50 uA = 25 A. Therefore, to measure the final collector current (I_C) in amperes, take 1/2 the meter reading.
8	PA	6	METER REV. REF B	25 V (Use voltage probes)	FWD	--	FINAL COLLECTOR VOLTAGE - Measure the final collector voltage (V_C). V_C is the meter 6 reading (0-30 V scale on portable test set, 25 V full scale on built-in metering.
9	--	--	--	--	--	--	Determine final input power (P_{in}). P_{in} equals $V_C \times I_C$. P_{in} should be less than: 180 watts for 90-watt models; 200 watts for 100-watt continuous duty models and 110-watt intermittent duty models.

90/100/110 W Power Amplifier
Alignment Procedure
Motorola No. PEPS-24461-O
7/18/77-UP



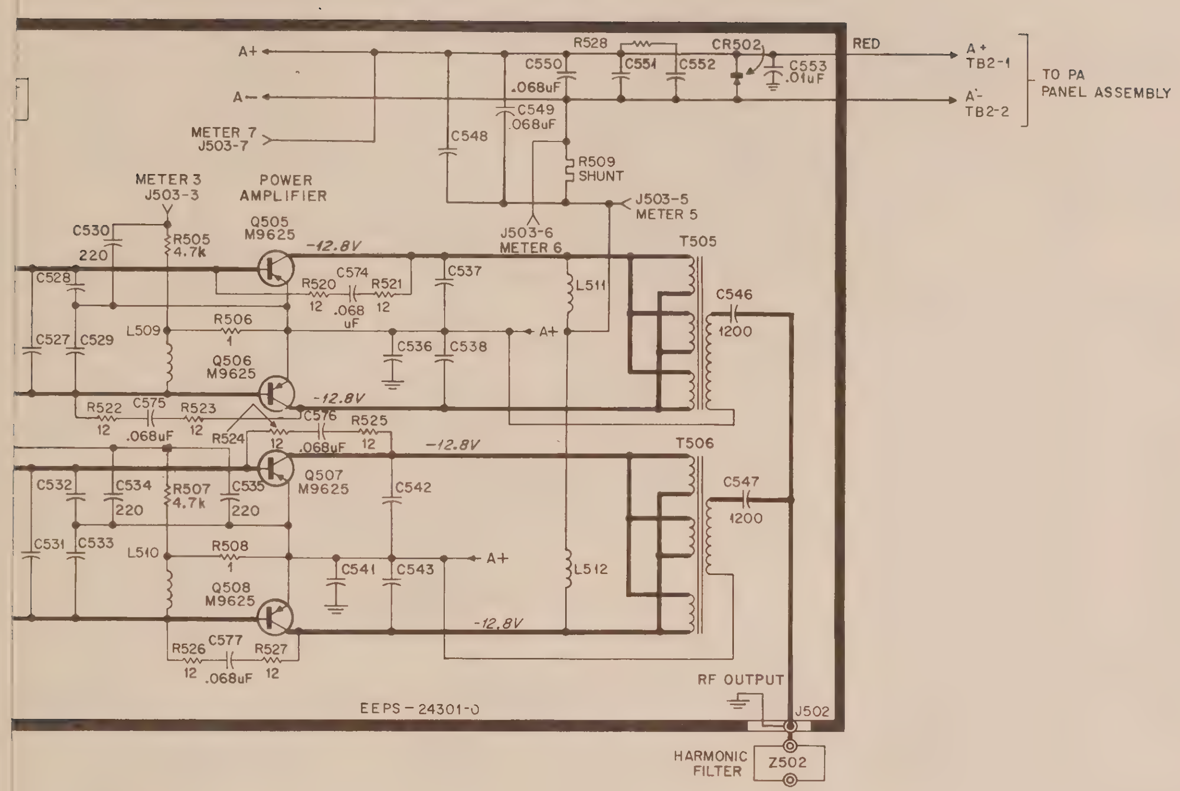

L502
L501
R502
C508
C513
C514
C557
C511
R504
C510
R513
C570
R512
C506
Q501
C505
T501
C517
R503
C515
L503
C556
C509
L504
C516
CONTROL
BLU
C518
C552
R528
C519
R514
C571
R515
Q502
C501
C520
C503
C507
C550
J501
CR502
CR501
C504
R501
L505
T502
C521
J503
7
6
5
1
2
3
4
C522
C551
L508
Q504
L506
Q503
A-
R511
R518
C573
R519
R516
C572
R517
C523
C524
C534
C530
R505
C525
L507
R507
C535
C526
T503
C502
T504
R508
A+
R506
L510
L509
C527
C533
C532
C531
C528
C529
Q508
Q507
Q505
Q506
R526
C577
R527
R524
C576
R525
R520
C574
R521
R522
C575
R523
R509
T506
T505
C542
C548
C543
C537
C538
C536
C549
L511
C541
L512
C547
C546
J502

OL-DEPS-24332-0

SHOWN FROM COMPONENT SIDE ● SOLDER SIDE BD-DEPS 6375-A

* THESE TRANSISTOR LEADS ARE CONNECTED TO ONLY THE COMPONENT SIDE OF THE BOARD

90/110 W Power Amplifier
Circuit Board Detail
Motorola No. PEPS-24462-O
7/18/77-UP


A+
A−
METER 7
J503-7
METER 3
J503-3
POWER
AMPLIFIER
R528
CR502
C550
.068uF
C551
C552
C553
.01uF
C549
.068uF
C548
R509
SHUNT
J503-5
METER 5
J503-6
METER 6
RED
A+
TB2-1
A-
TB2-2
TO PA
PANEL ASSEMBLY
C530
220
R505
4.7k
Q505
M9625
-12.8V
C528
R520
12
C574
.068
uF
R521
12
C537
L511
T505
C546
1200
C527
C529
L509
R506
1
C536
C538
A+
Q506
M9625
-12.8V
R522
12
C575
.068uF
R523
12
R524
12
C576
.068uF
R525
12
-12.8V
T506
C547
1200
Q507
M9625
C542
C532
C534
220
R507
4.7k
C535
220
C531
C533
L510
R508
1
C541
C543
A+
L512
Q508
M9625
-12.8V
R526
12
C577
.068uF
R527
12
RF OUTPUT
J502
EEPS-24301-0
HARMONIC
FILTER
Z502

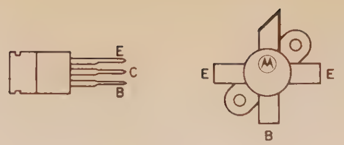
PENDENT UPON AMOUNT OF CUTBACK FROM
OL BOARD.
ASURED IN RESPECT TO A+ UNLESS OTHERWISE

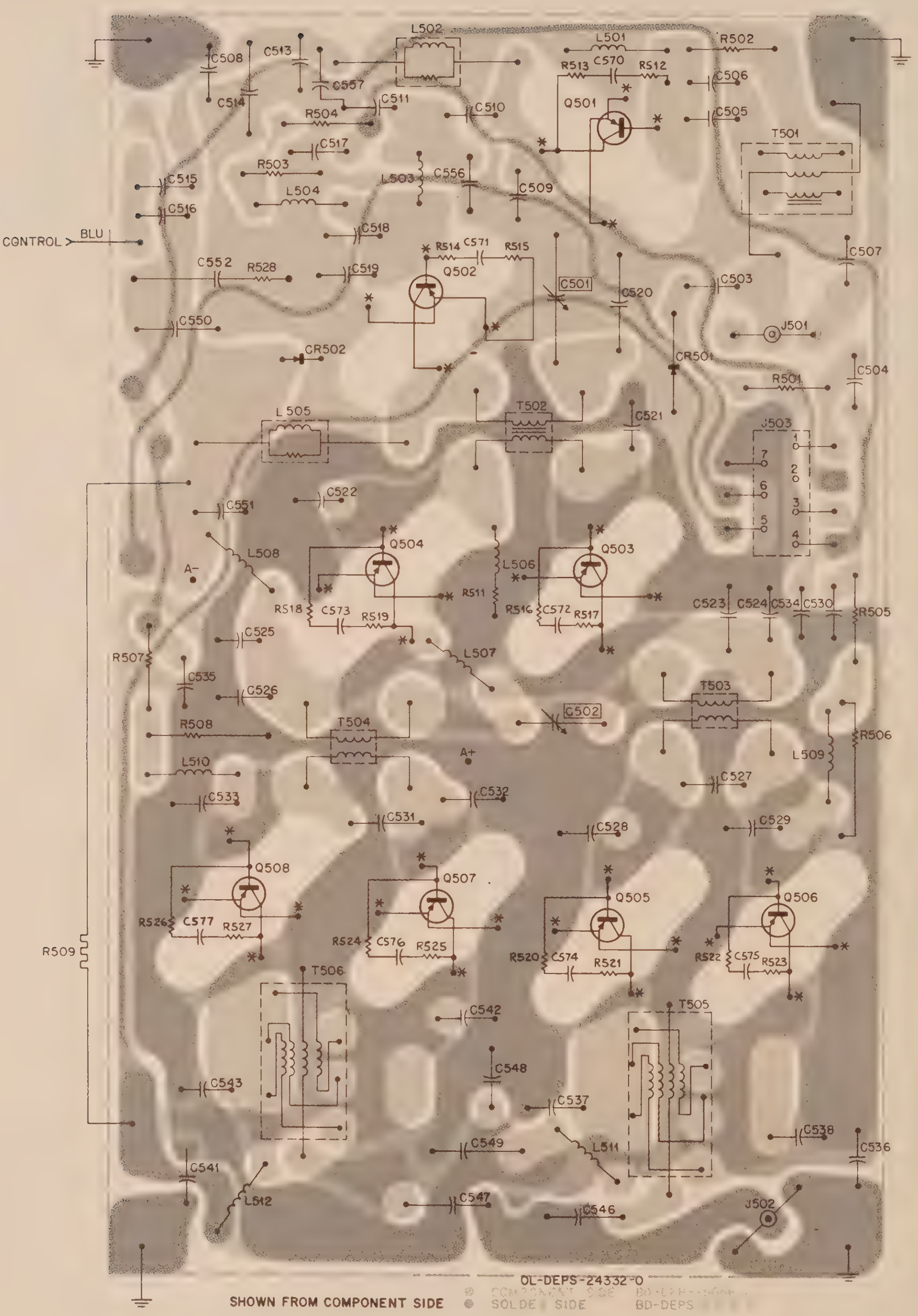
WISE SPECIFIED:
LUES ARE IN PICOFARADS.

EPS-24302-O

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

90/110 W Power Amplifier
Schematic Diagram
Motorola No. 63P81036E15-O
7/18/77-UP




L502
L501
R502
C508
C513
R513
C570
R512
C506
C514
C557
C511
C510
Q501
C505
R504
C517
T501
R503
L503
C556
C509
C515
L504
C516
C518
CONTROL
BLU
R514
C571
R515
C507
C552
R528
C519
Q502
C501
C503
C520
C550
J501
CR502
CR501
C504
R501
L505
T502
C521
J503
1
7
2
6
3
5
4
C522
C551
Q504
Q503
L508
L506
A-
R511
R518
C573
R519
R516
C572
R517
C523
C524
C534
C530
R505
C525
L507
R507
C535
T503
C526
C502
R508
T504
R506
A+
L509
L510
C527
C533
C532
C531
C528
C529
Q508
Q507
Q505
Q506
R526
C577
R527
R524
C576
R525
R520
C574
R521
R522
C575
R523
R509
T506
T505
C542
C548
C543
C537
C538
C536
C549
L511
C541
L512
C547
C546
J502
OL-DEPS-24332-0

SHOWN FROM COMPONENT SIDE ● COMPONENT SIDE BD-[illegible]
● SOLDER SIDE BD-DEPS

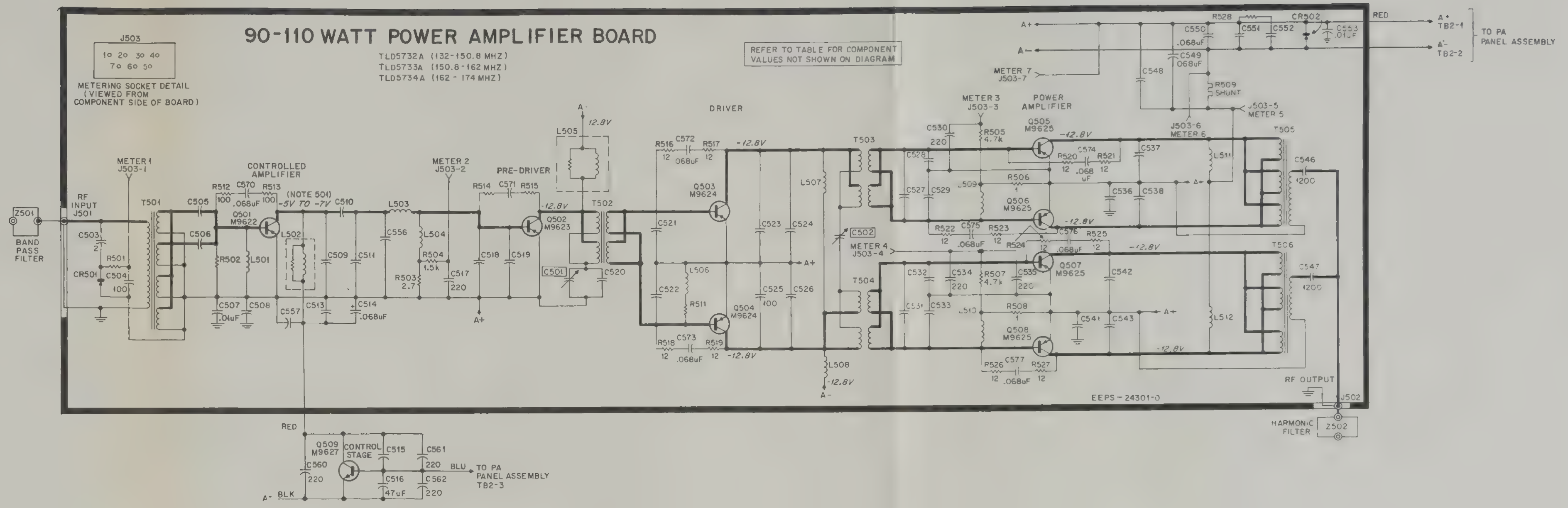
* THESE TRANSISTOR LEADS ARE CONNECTED TO ONLY THE COMPONENT SIDE OF THE BOARD

90/110 W Power Amplifier
Circuit Board Detail
Motorola No. PEPS-24462-O
7/18/77-UP

PA COMPONENT VALUES

REF SYMBOL	132-150.8 MHz	150.8-162 MHz	162-174 MHz
C501	4-40	1.5-18	1.5-18
C502	2.4-27	2-19.3	2-19.3
C505	62	49	62
C506	62	51	34
C508	160	130	130
C509	15	15	10
C510	175	51	39
C511	62	NOT USED	NOT USED
C513	160	130	130
C515	NOT USED	NOT USED	3.3 uF
C518	49	60	49
C519	49	60	43
C520	30	25	20
C521	62	43	43
C522	56	39	51
C523	80	100	120
C524	NOT USED	.01 uF	.05 uF
C526	NOT USED	.01 uF	.05 uF
C527	43	36	24
C528	75	75	80
C529	60	51	51
C531	43	36	24
C532	75	75	80
C533	62	60	68
C536	220	390	NOT USED
C537	130	150	100
C538	130	150	120
C541	220	130	130
C542	130	150	100
C543	120	130	100
C548	160	130	130
C551	160	130	130
C552	15 uF	100 uF	100 uF
C556	30	10	6
C557	NOT USED	NOT USED	4.7 uF
C571	NOT USED	.068 uF	.068 uF
L503	7-84400B03	1-1/2 TURNS	1-1/2 TURNS
L504	1 TURN	1 TURN	85 nH
L506	.29 uH	39 nH	.29 uH
L509	.29 uH	39 nH	.29 uH
L510	.29 uH	39 nH	.29 uH
R501	100k	150k	150k
R502	10	10	47
R511	NOT USED	2.7	NOT USED
R514	NOT USED	100	51
R515	NOT USED	100	51
R528	NOT USED	NOT USED	2.7
T503	24-84302C01	24-84464D01	24-82060L01
T504	24-84302C02	24-84464D01	24-82060L01
T505	25-84812B01	24-84812B01	25-84398B01
T506	25-84812B01	24-84812B01	25-84398B01

EPS-24303-O


90-110 WATT POWER AMPLIFIER BOARD
TLD5732A (132-150.8 MHZ)
TLD5733A (150.8-162 MHZ)
TLD5734A (162 - 174 MHZ)
J503
10 20 30 40
70 60 50
METERING SOCKET DETAIL (VIEWED FROM COMPONENT SIDE OF BOARD)
REFER TO TABLE FOR COMPONENT VALUES NOT SHOWN ON DIAGRAM
Z501
BAND PASS FILTER
RF INPUT J501
METER 1 J503-1
T504
C503 2
R501
CR501
C504 100
C505
C506
CONTROLLED AMPLIFIER
R512 100
C570 .068uF
R513 100
Q501 M9622
R502
L501
C507 .01uF
C508
(NOTE 501) -5V TO -7V
L502
C557
C509
C511
C510
C513
C514 .068uF
L503
C556
L504
R504 1.5k
R503 2.7
C517 220
METER 2 J503-2
A+
PRE-DRIVER
R514
C571
R515
C518
C519
Q502 M9623
-12.8V
L505
12.8V
A-
T502
C501
C520
DRIVER
R516 12
C572 .068uF
R517 12
-12.8V
Q503 M9624
C521
C522
L506
R511
Q504 M9624
R518 12
C573 .068uF
R519 12
-12.8V
C523
C524
C525 100
C526
A+
L507
C502
METER 4 J503-4
L508
-12.8V
A-
T503
T504
METER 3 J503-3
POWER AMPLIFIER
C530 220
R505 4.7k
C528
C527
C529
L509
Q505 M9625
-12.8V
R520 12
C574 .068 uF
R521 12
R506 1
Q506 M9625
-12.8V
R522 12
C575 .068uF
R523 12
R524
C576 .068uF
R525 12
C536
C537
C538
A+
C532
C534 220
R507 4.7k
C535 220
Q507 M9625
-12.8V
C531
C533
L510
R508 1
Q508 M9625
C541
C542
C543
A+
-12.8V
R526 12
C577 .068uF
R527 12
L511
L512
T505
T506
C546 1200
C547 1200
METER 7 J503-7
C548
C550 .068uF
C549 .068uF
R509 SHUNT
J503-5 METER 5
J503-6 METER 6
R528
C551
C552
CR502
C553 .01uF
A+
A-
RED
A+ TB2-1
A- TB2-2
TO PA PANEL ASSEMBLY
RF OUTPUT
J502
HARMONIC FILTER
Z502
EEPS-24301-0
RED
Q509 M9627
CONTROL STAGE
C560 220
C515
C516 47uF
C561 220
C562 220
BLU
TO PA PANEL ASSEMBLY TB2-3
A- BLK

POWER AMPLIFIER

501. VOLTAGES DEPENDENT UPON AMOUNT OF CUTBACK FROM POWER CONTROL BOARD.
502. VOLTAGES MEASURED IN RESPECT TO A+ UNLESS OTHERWISE SPECIFIED.
503. UNLESS OTHERWISE SPECIFIED: CAPACITOR VALUES ARE IN PICOFARADS.

EPS-24302-O

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

90/110 W Power Amplifier
Schematic Diagram
Motorola No. 63P81036E15-O
7/18/77-UP

	DESCRIPTION

trol

PL-5500-O

	CAPACITOR, fixed: 220 pF ±20%; 500 V
	TRANSISTOR: (SEE NOTE) NPN; type M9627
ERENCED ITEMS	
2	BRACKET ASSEMBLY includes:
1	BRACKET, transistor mounting
1	SOCKET, transistor
	SCREW, tapping: 6-20 x 1/2; 2 used
	WASHER, lock: #6 (external tooth); 2 used
01	INSULATOR, transistor
	LUG, solderless
01	LUG, flanged spade: 2 used
02	STRAP, cable harness: 4 used

tor Kit

PL-5501-O

	CAPACITOR, fixed: .068 uH ±10%; 100 V
	RESISTOR, fixed: ±10%; 1/2 W: 100 12

tor

PL-5503-O

	CAPACITOR, fixed: .068 uF ±10%; 100 V
	RESISTOR, fixed: 100 ±10%; 1/2 W 51 ±5%; 1/2 W 12 ±10%; 1/2 W

90/100/110 W POWER AMPLIFIER

MODEL CHART

TLD1682A	132-150.8 MHz	INTERMITTENT DUTY
TLD1683B	150.8-162 MHz	
TLD1684B	162-174 MHz	
TLD1692C	132-150.8 MHz	CONTINUOUS DUTY
TLD1693D	150.8-162 MHz	
TLD1694D	162-174 MHz	

TECHNICAL CHARACTERISTICS*

RF Power In	400 mW
Input Impedance	50 ohms
RF Power Out	90 W Continuous & Intermittent
	100 W Continuous
	110 W Intermittent
Output Impedance	50 ohms
Power Requirements	12.8 volts @20.5 amps

*All values are typical

1. DESCRIPTION

Motorola's "Micor" power amplifiers provide the following features:

-A minimum of 110 W (intermittent duty) or 100 W (continuous duty) rf output.

-All circuitry except power transistors (and control stage transistor in continuous duty stations) contained on one double-sided circuit board.

-Power transistors mounted directly to (but electrically isolated from) the heat sink.

-RF connections made through two coaxial connections which plug directly into the input and output filter assemblies located below the heat sink shelf.

-DC power supplied via two feed-through capacitors that also provide filtering.

-Input, output and most other interstage matching (with the exception of a single fixed-tuned matching network between the controlled amplifier stage and the pre-driver stage) is accomplished by the use of rf transformers wound around ferrite cores. Only two tuning adjustments are required due to the relatively broadband matching characteristics of the ferrite transformers and the low inductance leads of the silicon opposed emitter transistors.

-One metering socket which is accessible from the component side of the circuit board allows four major test points to be monitored and permits measurement of the dc current drawn by the final amplifier stage.

90/100/110 W POWER AMPLIFIER

MOTOROLA INC.
Communications Division

service publications
1301 E. Algonquin Road, Schaumburg, IL 60196

LEGEND:
L = 132-150.8 MHz
M = 150.8-162 MHz
H = 162-174 MHz

TLD5732A Power Amplifier Board (132-150.8 MHz)
TLD5733A Power Amplifier Board (150.8-162 MHz)
TLD5734A Power Amplifier Board (162-174 MHz)

PL-5504-O

NOTE
This parts list covers more than one model. Where differences exist a letter code is added to the reference symbol to indicate the applicable unit.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: pF; ±5%; 500 V: unless otherwise stated
C501L	20-83201B09	variable; 4-40; 100 V
C501M, 501H	20-83201B07	variable; 1.5-18; 100 V
C502L	19-83491E08	variable; 2.4-27
C502M, H	19-83491E07	variable; 2-19.3
C503	21-83406D52	2 ±0.25 pF
C504	21-84494B04	100
C505L	21-84494B02	62
C505M	21-84494B25	49
C505H	21-84494B02	62
C506L	21-84494B02	62
C506M	21-84494B01	51
C506H	21-84494B30	34
C507	21-82428B59	.01 uF +80-20%; 200 V
C508L	21-84494B51	160
C508M, H	21-84494B26	130
C509L	21-84494B38	15
C509M	21-84494B38	15
C509H	21-84494B29	10
C510L	21-84494B09	175
C510M	21-84494B01	51
C510H	21-84494B24	39
C511L	21-84494B02	62
C513L	21-84494B51	160
C513M, H	21-84494B26	130
C514	8-83813H05	.068 uF ±10%; 100 V
C515H	23-83214C17	3.3 uF ±20%; 15 V
C516	23-83214C10	47 uF ±20%; 6 V
C517	21-83596E10	220 ±20%
C518L	21-84494B25	49
C518M	21-84494B35	60
C518H	21-84494B25	49
C519L	21-84494B25	49
C519M	21-84494B35	60
C519H	21-84494B28	43
C520L	21-84936A06	30 ±1.5 pF; 2000 V
C520M	21-84936A04	25; 2000 V
C520H	21-84936A03	20; 2000 V
C521L	21-84494B02	62
C521M, H	21-84494B28	43
C522L	21-84494B45	56
C522M	21-84494B24	39
C522H	21-84494B01	51
C523L	21-84395B03	80; 250 V
C523M	21-84395B02	100; 250 V
C523H	21-84395B04	120; 250 V
C524M	21-82428B59	.01 uF +80-20%; 200 V
C524H	21-82372C04	.05 uF +80-20%; 25 V
C525	21-84395B02	100; 250 V
C526M	21-82428B59	.01 uF +80-20%;200 V
C526H	21-82372C04	.05 uF +80-20%; 25 V
C527L	21-84494B28	43
C527M	21-84494B43	36
C527H	21-84494B41	24
C528L	21-84494B31	75
C528M	21-84494B31	75
C528H	21-84494B03	80
C529L	21-84494B35	60
C529M, H	21-84494B01	51
C530	21-83596E10	220 ±20%
C531L	21-84494B28	43
C531M	21-84494B43	36
C531H	21-84494B41	24
C532L	21-84494B31	75
C532M	21-84494B31	75
C532H	21-84494B03	80
C533L	21-84494B02	62
C533M	21-84494B35	60
C533H	21-84494B34	68
C534, 535	21-83596E10	220 ±20%
C536L	21-84494B12	220
C536M	21-84494B18	390
C537L	21-84395B05	130; 250 V
C537M	21-84395B06	150; 250 V
C537H	21-84395B02	100; 250 V
C538L	21-84395B05	130; 250 V
C538M	21-84395B06	150; 250 V
C538H	21-84395B04	120; 250 V
C541L	21-84494B12	220
C541M, H	21-84494B26	130
C542L	21-83495B05	130; 250 V
C542M	21-84395B06	150; 250 V
C542H	21-84395B02	100; 250 V
C543L	21-84395B04	120; 250 V
C543M	21-84395B05	130; 250 V
C543H	21-84395B02	100; 250 V
C546, 547	21-84426B36	1200; 300 V
C548L	21-84494B51	160
C548M, H	21-84494B26	130
C549, 550	8-83813H05	.068 uF ±10%; 100 V
C551L	21-84494B51	160
C551M, H	21-84494B26	130
C522L	23-83210A21	15 uF -10+150%; 25 V
C552M	23-84669A19	100 uF +150-10%; 20 V
C552H	23-82783B04	100 uF ±20%; 25 V
C556L	21-84494B33	30
C556L	21-84494B33	30
C556M	21-84494B29	10
C556H	21-84494B74	6 ±0.5 pF
C557H	23-82783B25	4.7 uF ±10%; 25 V
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR501	48-82139G01	germanium
CR502	48-82525G01	silicon
		CONNECTOR, receptacle:
J501, 502	9-84231B03	phono
J503	9-84207B01	7-contact
		COIL, RF:
L501	24-83961B01	choke; 3 turns; coded BRN
L502	24-84392B03	choke; 6 turns
L503L	7-84400B03	inductor "bracket"
L503M, H	24-83884G03	1-1/2 turns
L504L, M	24-83961B03	choke; 1 turn; coded WHT
L504H	24-82723H18	choke; 85 nH
L505	24-84392B02	choke; 4 turns
L506L	24-82723H20	choke; 0.29 uH
L506M	24-82723H02	choke; 39 nH
L506H	24-82723H20	choke; 0.29 uH
L507, 508	24-84393B02	choke; 4-1/2 turns
L509L, H	24-82723H04	choke; 0.29 uH
L509M	24-82723H02	choke; 39 nH
L510M	24-82723H02	choke; 39 nH
L510L, H	24-82723H04	choke; 0.29 uH
L511, 512	24-84393B02	choke; 4-1;2 turns
		RESISTOR, fixed: ±10%; 1/4 W: unless otherwise stated
R501L	6-124C97	100k
R501M, H	6-124D02	150k
R502L, M	6-124A01	10 ±5%
R502H	6-124C17	47
R503	6-124D55	2.7
R504	6-124C53	1.5k
R505	6-124C65	4.7k
R506	6-125D70	1; 1/2 W
R507	6-124C65	4.7k
R508	6-125D70	1; 1/2 W
R509	6-84232B01	(meter shunt)
R511M	6-124D55	2.7
R528	6-124D55	2.7
		TRANSFORMER, RF:
T501	25-84396B01	pri: 5 turns sec: 4 windings, 1 turn each
T502	25-84397B01	pri: 2 windings, 1-3/4 turns each sec: 2 windings, 1-3/4 turns each
T503L	24-84302C01	pri: 2 windings, 2-3/4 turns each sec: 2 windings, 2-3/4 turns each NOTE: ("Lefthand" windings)
T503M	24-84464D01	pri: 3-3/4 turns sec: 3-3/4 turns
T503H	24-82060L01	pri: 2 windings, 2 turns each sec: 2 windings, 2 turns each
T504L	24-84302C02	pri: 2 windings, 2-3/4 turns each sec: 2 windings, 2-3/4 turns each NOTE: ("Righthand" windings)
T504M	24-84464D01	pri: 3-3/4 turns sec: 3-3/4 turns
T504H	24-82060L01	pri: 2 windings, 2 turns each sec: 2 windings, 2 turns each
T505L, M	25-84812B01	pri: 3 windings, 1-1/2 turns each sec: 6 turns
T505H	25-84398B01	pri: 3 windings, 1-1/2 turns each sec: 5 turns
T506L, M	25-84812B01	pri: 3 windings, 1-1/2 turns each sec: 6 turns
T506H	25-84398B01	pri: 3 windings, 1-1/2 turns each sec: 5 turns
NON-REFERENCED ITEM		
	14-84266B01	INSULATOR (teflon); 2 used

Exciter Output Filter PL-1721-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		FILTER, RF: bandpass:
Z501L	TFD6111A	132-150.8 MHz
Z501M, 501H	TFD6112A	150.8-174 MHz

TRN6968A Hardware & Heat Sink Kit,
110 W PA PL-5516-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C553	21-84211B02	.01 uF; 250 V
		TRANSISTOR: (SEE NOTE)
Q501	48-869622	PNP; type M9622
Q502	48-869623	PNP; type M9623
Q503, 504	48-869624	PNP; type M9624
Q505 thru 508	48-869625	PNP; type M9625
NON-REFERENCED ITEMS		
	3-114406	SCREW, cap: 4-40 x 5/16"; 16 used
	3-134184	SCREW, tapping: 4-40 x 5/16" (w/internal lockwasher); 4 used
	3-134212	SCREW; tapping: 4-40 x 5/16" (w/external lockwasher); 8 used
	3-139000	SCREW, machine: 10-32 x 1-1/2"; 2 used
	4-115362	WASHER, lock: #10 (external tooth); 2 used
	4-801846	WASHER, insulating
	7-83269L01	BRACKET, hinge
	14-84290B02	INSULATOR, circuit board
	26-84170G02	HEAT SINK
	42-82234G01	RING, cord; 2 used

TRN8069A Resistor-Capacitor Kit
(132-150.8 MHz) PL-5502-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C570, 572, thru 577	8-83813H05	.068 uF ±10%; 100 V
		RESISTOR, fixed: ±10%; 1/2 W:
R512, 513	6-125C25	100
R516 thru 527	6-125C03	12

TRN6966A Transistor Control
Bracket Assembly PL-5500-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITOR, fixed:
C560, 561, 562	21-410115	220 pF ±20%; 500 V
		TRANSISTOR: (SEE NOTE)
Q509	48-869627	NPN; type M9627
NON-REFERENCED ITEMS		
	1-80797B32	BRACKET ASSEMBLY includes:
	7-83273L01	BRACKET, transistor mounting
	9-84935D01	SOCKET, transistor
	3-3360	SCREW, tapping: 6-20 x 1/2; 2 used
	4-7666	WASHER, lock: #6 (external tooth); 2 used
	14-82399B01	INSULATOR, transistor
	29-812979	LUG, solderless
	29-84078B01	LUG, flanged spade: 2 used
	42-10217A02	STRAP, cable harness: 4 used

TRN6445A Resistor-Capacitor Kit
(150.8-162 MHz) PL-5501-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITOR, fixed:
C570 thru 577	8-83813H05	.068 uH ±10%; 100 V
		RESISTOR, fixed: ±10%; 1/2 W:
R512 thru 515	6-125C25	100
R516 thru 527	6-125C03	12

TLD5502A Resistor-Capacitor
(162-174 MHz) PL-5503-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITOR, fixed:
C570 thru 577	8-83813H05	.068 uF ±10%; 100 V
		RESISTOR, fixed:
R512, 513	6-125C25	100 ±10%; 1/2 W
R514, 515	6-125A18	51 ±5%; 1/2 W
R516 thru 527	6-125C03	12 ±10%; 1/2 W

90/100/110 W POWER AMPLIFIER

MODEL CHART

TLD1682A	132-150.8 MHz	INTERMITTENT DUTY
TLD1683B	150.8-162 MHz	
TLD1684B	162-174 MHz	
TLD1692C	132-150.8 MHz	CONTINUOUS DUTY
TLD1693D	150.8-162 MHz	
TLD1694D	162-174 MHz	

TECHNICAL CHARACTERISTICS*

RF Power In	400 mW
Input Impedance	50 ohms
RF Power Out	90 W Continuous & Intermittent
	100 W Continuous
	110 W Intermittent
Output Impedance	50 ohms
Power Requirements	12.8 volts @20.5 amps

*All values are typical

1. DESCRIPTION

Motorola's "Micor" power amplifiers provide the following features:

-A minimum of 110 W (intermittent duty) or 100 W (continuous duty) rf output.

-All circuitry except power transistors (and control stage transistor in continuous duty stations) contained on one double-sided circuit board.

-Power transistors mounted directly to (but electrically isolated from) the heat sink.

-RF connections made through two coaxial connections which plug directly into the input and output filter assemblies located below the heat sink shelf.

-DC power supplied via two feed-through capacitors that also provide filtering.

-Input, output and most other interstage matching (with the exception of a single fixed-tuned matching network between the controlled amplifier stage and the pre-driver stage) is accomplished by the use of rf transformers wound around ferrite cores. Only two tuning adjustments are required due to the relatively broadband matching characteristics of the ferrite transformers and the low inductance leads of the silicon opposed emitter transistors.

-One metering socket which is accessible from the component side of the circuit board allows four major test points to be monitored and permits measurement of the dc current drawn by the final amplifier stage.

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Communications Division

service publications
1301 E. Algonquin Road, Schaumburg, IL 60196

-Due to the heat sink mounting requirements for this board, servicing is accomplished from the component side of the board.

-Diode protection against reverse polarity voltage (board mounted diode).

-Output protection provided by a control stage transistor driven by power control circuit. (Controls gain of the first stage). In intermittent duty stations, a single-wire connection provides interconnection between power control and PA circuitry. In continuous duty stations three wire connections provide the interconnection.

2. FUNCTIONAL OPERATION

Refer to the block diagram, Figure 1, and the schematic diagram. This series of power amplifiers requires a 400 mW rf input from the exciter board. This input is passed through a bandpass filter assembly and a ferrite step-down transformer (to match the input impedance to the first stage) to the gain-controlled amplifier stage. The external power control circuit which drives the control stage transistor determines the gain of this stage. The power control circuit monitors the output of the final stages of the power amplifier, the load condition and the heat sink temperature.

The output of the gain-controlled amplifier is passed through a fixed-tuned broadband matching network and applied to the pre-driver stage. A second ferrite transformer is utilized to match the single-ended output of the pre-driver stage to the input of the push-pull driver stage. The output of the driver stage is split by a pair of transformers to drive each of the push-pull final power amplifier stages. The output from each final stage is stepped up in impedance by ferrite transformers and paralleled to provide the 50-ohm output impedance to match the input impedance of the harmonic filter.

Pin 1 of the metering receptacle provides a means of checking the incoming signal from the exciter. Pin 2 permits observation of the drive output of the first stage and an indication of the operation of the pre-driver stage. Pins 3 and 4 reflect the output drive signal and operation of the two push-pull power amplifier stages. Reference position A on a Motorola Portable Test Set uses pin 7 of the metering socket as an A+ reference against which the outputs of pins 1, 2, 3, and 4 are checked. Switch the test set to reference position B which uses pin 6 as a reference and then switch to meter position 5. This provides a reading across a calibrated resistor through which the current is drawn by the final amplifier stages.

3. MAINTENANCE

a. General

NOTE

Because of the complexity involved and time required to remove the PA board, compared to plug-in boards, it is not recommended that the PA board be removed. Proper troubleshooting techniques will usually locate defective components "on the spot".

This section of the manual provides the maintenance shop procedures for the PA board. It assumes that preliminary tests have already localized the trouble to the PA board. These procedures include measurements with optional built-in metering or a Motorola portable test set, a vom, a complete set of performance tests, and extensive troubleshooting procedures.

CAUTION

The PA board must be installed in the transmitter for testing to provide the necessary power, ground, control, heat sinking and signal connections.

b. Recommended Test Equipment

The following test equipment is the minimum required for troubleshooting and adjusting the PA. All such equipment is battery operated which permits testing to be performed in the field where no commercial power is available for bench type test equipment. Option built-in station metering when incorporated takes the place of the portable test set.

(1) Motorola S1056B through S1059B Portable Test Set and Model TEK-37 or TEK-37A Adapter Cable. The portable test set is required for checking each stage for proper operation.

(2) A Motorola Solid-State DC Multimeter or a 20, 000 ohm-per-volt multimeter should be used, however a low impedance multimeter is acceptable for dc voltage measurements only.

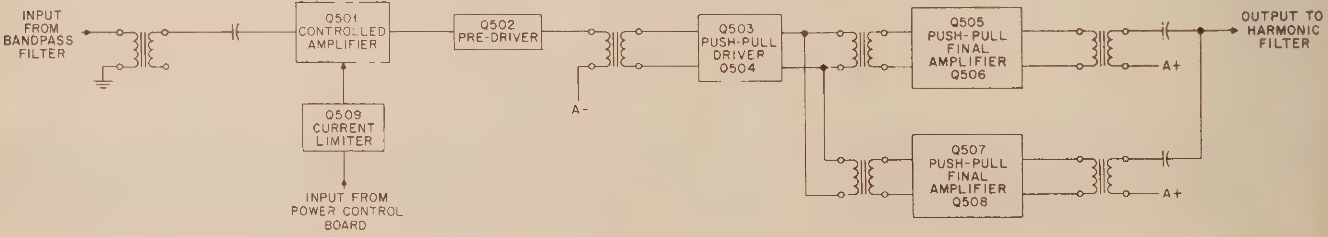

INPUT FROM BANDPASS FILTER
Q501 CONTROLLED AMPLIFIER
Q509 CURRENT LIMITER
INPUT FROM POWER CONTROL BOARD
Q502 PRE-DRIVER
A-
Q503 PUSH-PULL DRIVER Q504
Q505 PUSH-PULL FINAL AMPLIFIER Q506
Q507 PUSH-PULL FINAL AMPLIFIER Q508
A+
A+
OUTPUT TO HARMONIC FILTER
69D81008E43-A

Figure 1. Block Diagram

(3) Motorola T1013A RF Load Resistor (dummy load) or equivalent.

c. Test Set Metering

The PA is equipped with a metering receptacle which allows five major test points to be measured. PA metering can be made at each of the five test points by merely rotating a selector switch on the built-in station meter kit or on the test set. A failure in almost any portion of the PA will produce a low or zero meter reading for one or more of the test points. Improper alignment will also cause improper meter readings.

(1) Using the Optional Built-In Station Meter

This procedure is valid only with intermittent duty station. Continuous duty stations with built-in station metering measure only exciter output (PA input), PA current, and PA voltage.

a. The entire transmitter is necessary for testing PA boards including the power control board for proper control.

b. The output of the station must be terminated in one of three types of loads:

--The antenna load.

--A dummy load such as Motorola's T1013A RF Load Resistor.

--An RF Wattmeter.

NOTE

A dummy load is preferred to the antenna to eliminate the possibility of shutback by the power control board due to a defective antenna.

c. Turn the station ON.

d. With the meter selector switch set to position 1, key the transmitter and observe the meter. Unkey the transmitter.

Set the selector switch to position 2, 3, and 4 keying the transmitter and observing the meter reading for each. On multi-frequency stations, repeat the readings for each frequency. An analysis of the meter readings for determining whether each circuit is good or bad follows the "Using the Portable Test Set" paragraphs.

(2) Using the Portable Test Set

To make the measurements, the portable test set must be connected to the station as follows.

a. Set the function selector switch of the portable test set to the XMTR position.

b. Set the meter reversing switch of the test set to the METER REV position, the selector switch to position 1, and REF switch to position A.

c. Connect the 20-pin meter cable plug to the test set. When the test set is not in use, disconnect the 20-pin plug to conserve battery life. The plug acts as an on-off switch completing the battery circuit.

d. Connect the red "control" plug of the adapter cable to the control receptacle on the local or remote control board. Connect the white "metering" plug of the adapter cable to the receptacle on the PA circuit board.

e. The entire transmitter is necessary for testing PA boards including the power control board for proper control.

f. The output of the station must be terminated in one of three types of loads:

--The antenna load.

--A dummy load such as Motorola's T1013A RF Load Resistor.

--An RF Wattmeter.

NOTE

A dummy load is preferred to the antenna to eliminate the possibility of shutback by the power control board due to a defective antenna.

g. Turn the station ON.

h. Key the transmitter with the XMTR ON button on the test set. Observe the meter. Unkey the transmitter.

i. Set the selector switch to positions 2, 3, & 4; then switch to reference position B and meter position 5 respectively, keying the transmitter and observing the meter reading for each. On multi-frequency stations, repeat the readings for each frequency. An analysis of the meter readings for determining whether each circuit is good or bad follows.

Each time maintenance is performed on the PA the readings should be compared with the previous set of readings. Any degradation of performance will quickly be noted. Often, a lower reading may indicate an impending failure and corrective action may be taken before the circuit fails entirely.

d. Performance Tests

(1) No performance test of the power amplifier is required other than rf power output from the station as a whole. Before checking power output:

(a) The exciter board should be known to be operating normally.

(b) The power control board should be known to be functioning normally.

(2) Key the transmitter and observe power out, which should be 90, 100, or 110 watts, depending upon licensing.

MINIMUM PA METER READINGS

SELECTOR SWITCH POSITION	REFERENCE SWITCH POSITION PORTABLE TEST SET ONLY	MINIMUM METER READINGS	CIRCUIT METERED	IF LOW, DEFECTIVE CIRCUIT IS: (SEE TROUBLESHOOTING CHARTS)
1	A	15 uA	Exciter Output (input to Controlled Amplifier Q501)	Exciter output, input circuitry of controlled amplifier stage Q501
2	A	5 uA	Input of Predriver Stage (Q502)	Output of controlled amplifier stage input circuitry of predriver stage
3	A	12 uA (100 W/ 110 W) 10 uA (90 W)	Input of Final Amplifier Stage Q505, Q506	Input of Q505, Q506 stages, output of driver stage (Q502, Q503), output of predriver stage Q502
4	A	12 uA (100 W/ 110 W) 10 uA (90 W)	Input of Final Amplifier Stage Q507, Q508	Input of Q507, Q508 stage output of driver stage Q502, Q503. Output of predriver stage Q502
5 (or 2 SEE NOTE)	B	21 uA min. 27 uA max. 90 W 23 uA min. 100 W 37 uA max. 110 W	Total Current in Final Amplifier Stages Q505, Q506, Q507, Q508	Output of final amplifier stages Q505-Q508, power control board antenna switch, antenna.
6 (or 3 SEE NOTE)	B	12 V (0-30 V scale)	Final Amplifier Stage	Final amplifier stage A+ or A- input

NOTE

When optional built-in station metering is used in continuous duty stations, only exciter output (PA input), final PA current, and final PA voltage may be checked. Selector switch position functions change to:

SELECTOR SWITCH POSITION	FUNCTION METERED
1	PA input
2	PA current
3	PA voltage
4	Forward power monitor
5	Reflected power monitor
6	Control voltage

(3) If necessary, adjust POWER SET control for rated power output.

CAUTION

The PA shield must always be in place during operation of the radio set and should be kept in place as much as possible while testing and troubleshooting. The circuit board must always be secured in place with all mounting screws. The transistors (including the control stage transistor) must be secured in place to provide proper heat sinking, and the feedthrough connectors must be soldered in place to provide dc power and good rf grounding.

4. TROUBLESHOOTING

If a problem has been localized to the PA decks, several checks can be made prior to extensive troubleshooting.

a. Visual

Visually check for obvious physical defects such as broken leads, broken plating, broken or disconnected components or overheated parts. Before any attempt is made to change parts, the circuit should be checked to insure that the problem causing the original failure has been identified and corrected, otherwise damage to the new part may occur.

b. Voltage Checks

Check for A+ and A- at the feedthrough connections and for proper voltages at the collectors of each transistor. Certain defects such as broken plating, broken leads etc. may not be obvious to a visual inspection.

c. Troubleshooting

If test set readings are abnormal or tests indicate subnormal performance, a logical troubleshooting procedure is required to isolate the defective component efficiently. The accompanying troubleshooting chart summarize these results in a logical sequence. A few voltage and resistance checks in the suspected circuit should readily isolate the defective component. Note that all power for the circuits in the PA is from A- referenced to A+ (not to chassis ground, this feature allows operation from positive or negative ground power sources when an optional positive ground converter is used).

CAUTION

Due to the voltage requirements of P N-P transistors, all "rf ground" plating is A+ and is "hot" with respect to chassis ground in negative ground applications. Because of this, caution should be used to prevent connection of "ground" plating on the PA board to chassis ground, either directly or by the use of test equipment ground leads. If ac operated test equipment is used, the ground lead must not be electrically connected to ac line ground.

The schematic diagram of the PA board contains the voltage readings required for troubleshooting. The readings are typical for normal operating conditions at rated power output for the radio. Refer to the troubleshooting chart, and the schematic when a defect is suspected in the PA board.

5. PA REPAIR NOTES

a. Resistance Measurement of Transistors in Push-Pull Pairs

Due to the fact that transistors in push-pull pairs are dc connected at both base and emitter, BOTH devices should be measured when a defect in the pair is suspected.

b. Transistor Removal Procedure

(1) Unscrew both mounting screws from the base of the transistors. The nuts (for the mounting screws) on the reverse side of the shelf are captivated and will not fall out.

(2) Remove excess solder from around transistor tabs with a vacuum bulb type de-soldering device.

(3) Gently lift each lead, one at a time while applying heat.

(4) When all four leads are loose from the board carefully lift out the transistor.

c. Transistor Installation Procedure

(1) Pre-tin underside of each transistor lead.

(2) Apply a light coat of Wakefield Thermal Compound to the underside of the transistor mounting base and to the heat sink.

(3) Install the transistor making sure that all collector leads face the proper direction. Refer to the circuit board detail.

(4) Screw down the two mounting screws securely.

(5) Solder each transistor lead one at a time to the circuit board. The use of a generous amount of solder will insure a good contact of the entire tab to the board. Use care that solder does not bridge to other plating or that solder does not flow into the cutout in the circuit board.

d. Procedures for Resistance Measurements of Transistors

(1) Set ohmmeter to RX1, RX10 or RX100 scale (preferably RX10 if available).

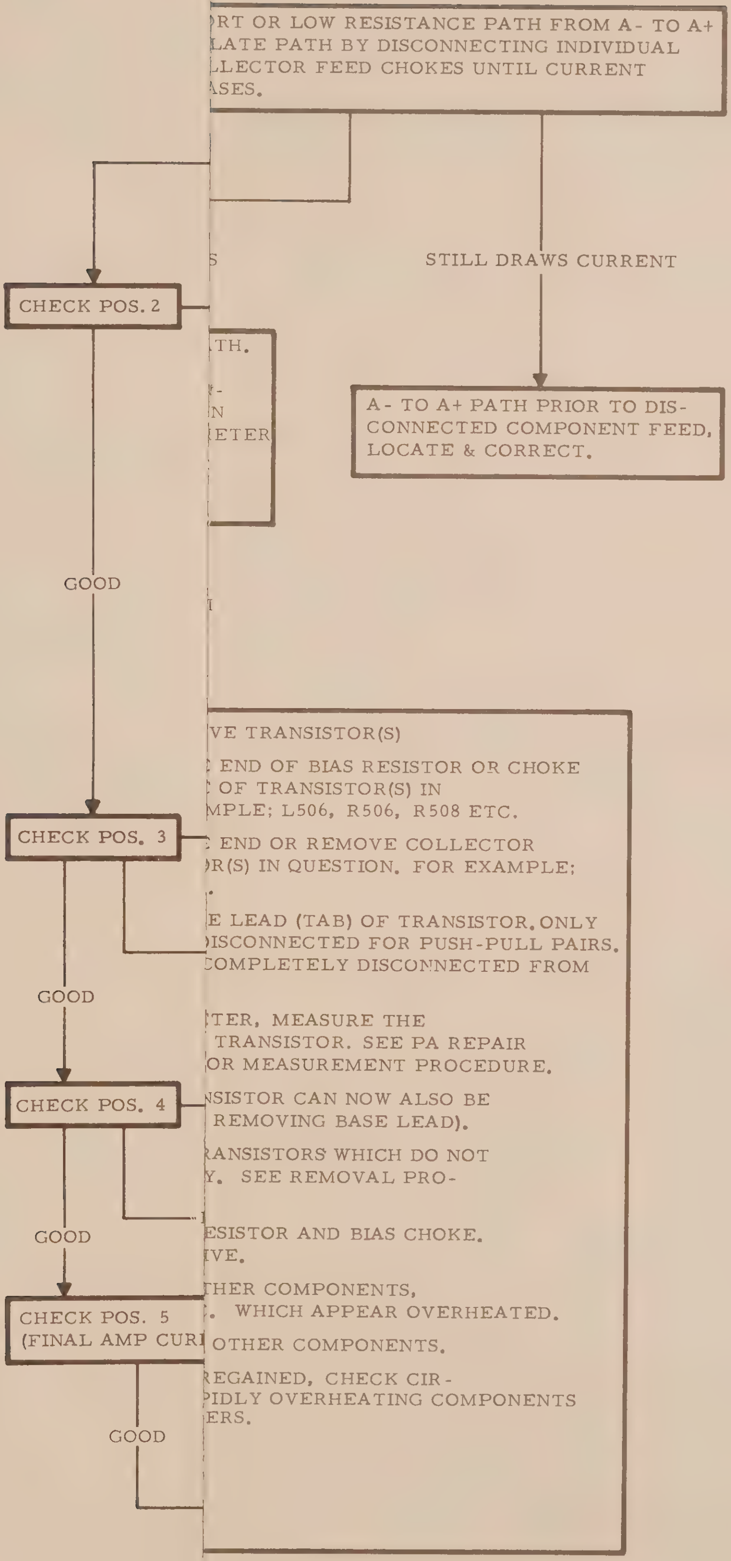
(2) Measure the resistance from lead to lead as described:

(a) With the positive probe on the base, no indication (very high impedance) should be observed when the negative probe is touched to the collector or emitter. (Reverse drop measurement).

(b) With the negative probe on the base, a relatively low impedance should be observed when touching the positive probe to the collector and emitter. (Forward drop measurement.)

(c) No indication should be observed from collector to emitter regardless of the polarity of the ohmmeter probes.

Should any indication be observed in measurements (a) or (c), the transistor is defective and should be replaced.


RT OR LOW RESISTANCE PATH FROM A- TO A+
LATE PATH BY DISCONNECTING INDIVIDUAL
LLECTOR FEED CHOKES UNTIL CURRENT
SES.
S
STILL DRAWS CURRENT
CHECK POS. 2
TH.
N
ETER
A- TO A+ PATH PRIOR TO DIS-
CONNECTED COMPONENT FEED,
LOCATE & CORRECT.
GOOD
VE TRANSISTOR(S)
END OF BIAS RESISTOR OR CHOKE
OF TRANSISTOR(S) IN
MPLE; L506, R506, R508 ETC.
CHECK POS. 3
END OR REMOVE COLLECTOR
R(S) IN QUESTION. FOR EXAMPLE;
E LEAD (TAB) OF TRANSISTOR. ONLY
ISCONNECTED FOR PUSH-PULL PAIRS.
COMPLETELY DISCONNECTED FROM
GOOD
TER, MEASURE THE
TRANSISTOR. SEE PA REPAIR
OR MEASUREMENT PROCEDURE.
CHECK POS. 4
NSISTOR CAN NOW ALSO BE
REMOVING BASE LEAD).
ANSISTORS WHICH DO NOT
Y. SEE REMOVAL PRO-
GOOD
ESISTOR AND BIAS CHOKE.
IVE.
HER COMPONENTS,
. WHICH APPEAR OVERHEATED.
CHECK POS. 5
(FINAL AMP CUR
OTHER COMPONENTS.
REGAINED, CHECK CIR-
IDLY OVERHEATING COMPONENTS
ERS.
GOOD

BOTH devices should be measured when a defect in the pair is suspected.

b. Transistor Removal Procedure

(1) Unscrew both mounting screws from the base of the transistors. The nuts (for the mounting screws) on the reverse side of the shelf are captivated and will not fall out.

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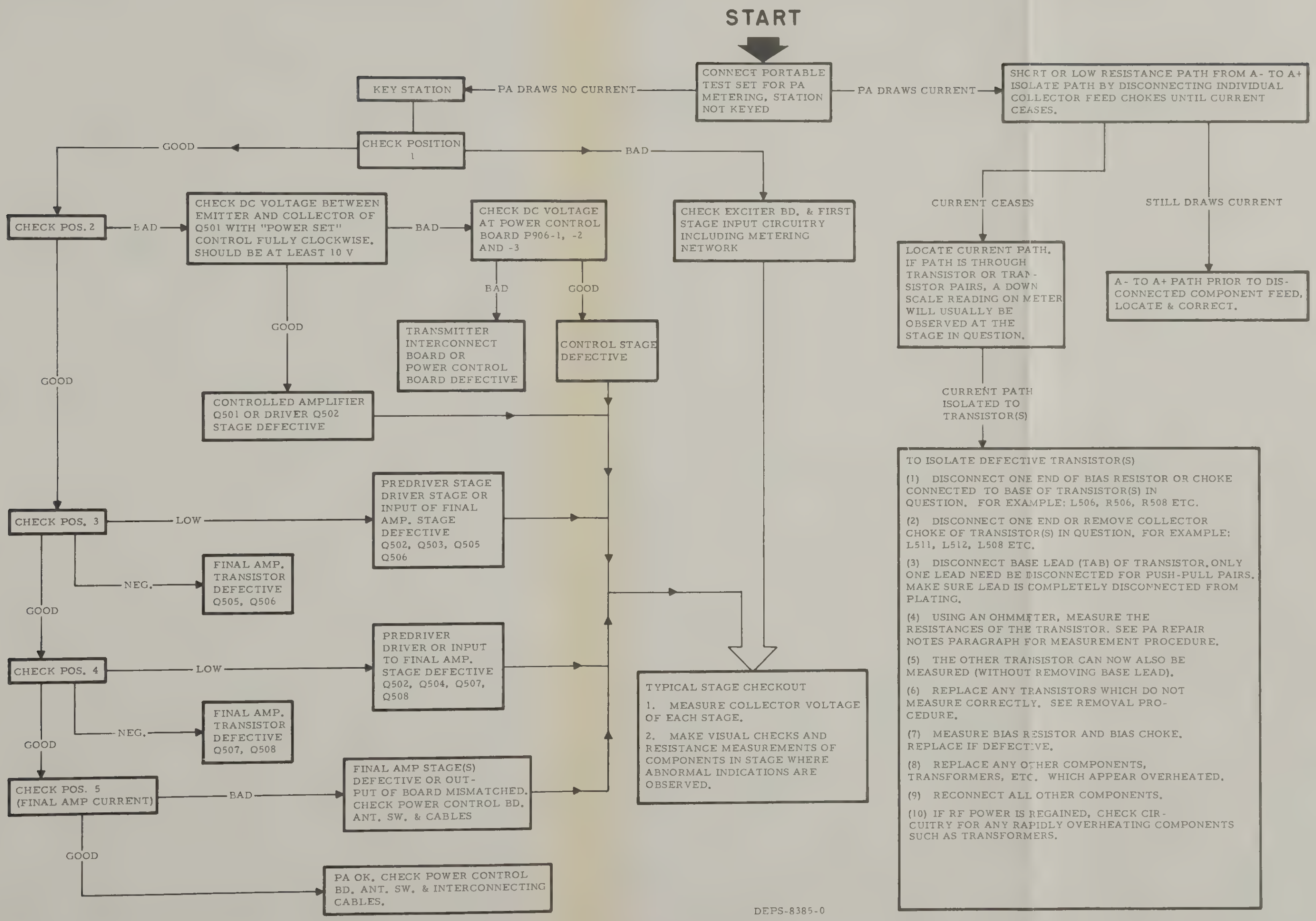
(b) With the negative probe on the base, a relatively low impedance should be observed when touching the positive probe to the collector and emitter. (Forward drop measurement.)

(c) No indication should be observed from collector to emitter regardless of the polarity of the ohmmeter probes.

Should any indication be observed in measurements (a) or (c), the transistor is defective and should be replaced.

PA TROUBLESHOOTING CHART



CONNECT PORTABLE TEST SET FOR PA METERING, STATION NOT KEYED

KEY STATION

CHECK POSITION 1

CHECK POS. 2

CHECK DC VOLTAGE BETWEEN EMITTER AND COLLECTOR OF Q501 WITH "POWER SET" CONTROL FULLY CLOCKWISE. SHOULD BE AT LEAST 10 V

CHECK DC VOLTAGE AT POWER CONTROL BOARD P906-1, -2 AND -3

TRANSMITTER INTERCONNECT BOARD OR POWER CONTROL BOARD DEFECTIVE

CONTROL STAGE DEFECTIVE

CONTROLLED AMPLIFIER Q501 OR DRIVER Q502 STAGE DEFECTIVE

CHECK EXCITER BD. & FIRST STAGE INPUT CIRCUITRY INCLUDING METERING NETWORK

CHECK POS. 3

PREDRIVER STAGE DRIVER STAGE OR INPUT OF FINAL AMP. STAGE DEFECTIVE Q502, Q503, Q505 Q506

FINAL AMP. TRANSISTOR DEFECTIVE Q505, Q506

CHECK POS. 4

PREDRIVER DRIVER OR INPUT TO FINAL AMP. STAGE DEFECTIVE Q502, Q504, Q507, Q508

FINAL AMP. TRANSISTOR DEFECTIVE Q507, Q508

CHECK POS. 5 (FINAL AMP CURRENT)

FINAL AMP STAGE(S) DEFECTIVE OR OUTPUT OF BOARD MISMATCHED. CHECK POWER CONTROL BD. ANT. SW. & CABLES

PA OK. CHECK POWER CONTROL BD. ANT. SW. & INTERCONNECTING CABLES.

TYPICAL STAGE CHECKOUT

1. MEASURE COLLECTOR VOLTAGE OF EACH STAGE.

2. MAKE VISUAL CHECKS AND RESISTANCE MEASUREMENTS OF COMPONENTS IN STAGE WHERE ABNORMAL INDICATIONS ARE OBSERVED.

SHORT OR LOW RESISTANCE PATH FROM A- TO A+ ISOLATE PATH BY DISCONNECTING INDIVIDUAL COLLECTOR FEED CHOKES UNTIL CURRENT CEASES.

LOCATE CURRENT PATH. IF PATH IS THROUGH TRANSISTOR OR TRANSISTOR PAIRS, A DOWN SCALE READING ON METER WILL USUALLY BE OBSERVED AT THE STAGE IN QUESTION.

A- TO A+ PATH PRIOR TO DISCONNECTED COMPONENT FEED, LOCATE & CORRECT.

TO ISOLATE DEFECTIVE TRANSISTOR(S)

(1) DISCONNECT ONE END OF BIAS RESISTOR OR CHOKE CONNECTED TO BASE OF TRANSISTOR(S) IN QUESTION. FOR EXAMPLE: L506, R506, R508 ETC.

(2) DISCONNECT ONE END OR REMOVE COLLECTOR CHOKE OF TRANSISTOR(S) IN QUESTION. FOR EXAMPLE: L511, L512, L508 ETC.

(3) DISCONNECT BASE LEAD (TAB) OF TRANSISTOR. ONLY ONE LEAD NEED BE DISCONNECTED FOR PUSH-PULL PAIRS. MAKE SURE LEAD IS COMPLETELY DISCONNECTED FROM PLATING.

(4) USING AN OHMMETER, MEASURE THE RESISTANCES OF THE TRANSISTOR. SEE PA REPAIR NOTES PARAGRAPH FOR MEASUREMENT PROCEDURE.

(5) THE OTHER TRANSISTOR CAN NOW ALSO BE MEASURED (WITHOUT REMOVING BASE LEAD).

(6) REPLACE ANY TRANSISTORS WHICH DO NOT MEASURE CORRECTLY. SEE REMOVAL PROCEDURE.

(7) MEASURE BIAS RESISTOR AND BIAS CHOKE. REPLACE IF DEFECTIVE.

(8) REPLACE ANY OTHER COMPONENTS, TRANSFORMERS, ETC. WHICH APPEAR OVERHEATED.

(9) RECONNECT ALL OTHER COMPONENTS.

(10) IF RF POWER IS REGAINED, CHECK CIRCUITRY FOR ANY RAPIDLY OVERHEATING COMPONENTS SUCH AS TRANSFORMERS.

POWER AMPLIFIER ALIGNMENT PROCEDURE (CONT'D)

STEP	ADJUST	METERING PLUG LOCATION	SELECTOR SWITCH POSITION	METER REV. & ADAPTER CABLE REF. SWITCHES (SEE NOTE)	STAGE AND PROCEDURE
5	C501, C502	POWER CONTROL BOARD	5	METER REV. REF B	PA DRIVER OUTPUT - Tune C501, then C502 for a minimum meter 5 reading.
6	POWER SET	POWER CONTROL BOARD	Wattmeter or 1	METER REV. REF A	OUTPUT - Adjust the POWER SET control for rated power output and perform step 5. (If rated power cannot be attained, repeat steps 4 and 5.)
			5	METER REV. REF B	Check meter 5 reading, it must not exceed 50 uA.
7		PA	5	METER REV. REF B	FINAL COLLECTOR CURRENT - Move the metering plug to the PA. Measure the final collector current (I_c). I_c in amperes is the meter 5 reading (0-50) x 1/2.
8		PA	6	METER REV. REF B	FINAL COLLECTOR VOLTAGE - Measure the final collector voltage (V_c). V_c is the meter 6 reading (0-30 volt scale).
9					Determine final input power (P_{in}). P_{in} equals V_c x I_c. P_{in} should be less than: 180 watts for 90-watt models; 200 watts for 100-watt continuous duty models and 110-watt intermittent duty models.

NOTE

Alignment may be performed using a Motorola S1056B thru S1059B Portable Test Set or optional built-in station metering. The OSC. & METER REV. SWITCH column refers to portable test set usage - - polarity is automatically reversed as required when built-in station metering is used.

EXCERPTS FROM FCC REGULATIONS

FCC Regulations state that:

1. Radio transmitters may be tuned or adjusted only by persons holding a first or second class commercial radiotelephone operator's license or by personnel working directly under their immediate supervision.
2. The power input to the final radio frequency stage shall not exceed the maximum figure specified on the current station authorization. This power input shall be measured and the results recorded:
   a. When the transmitter is initially installed.
   b. When any change is made in the transmitter which may increase the power input.
   c. At intervals not to exceed one year.
3. Frequency and deviation of a transmitter must be checked:
   a. When it is initially installed.
   b. When any change is made in the transmitter which may affect the carrier frequency or modulation characteristics.
   c. At intervals not to exceed one year.

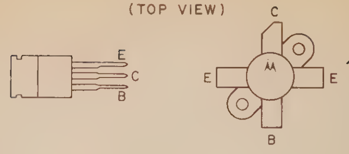
POWER AMPLIFIER ALIGNMENT PROCEDURE

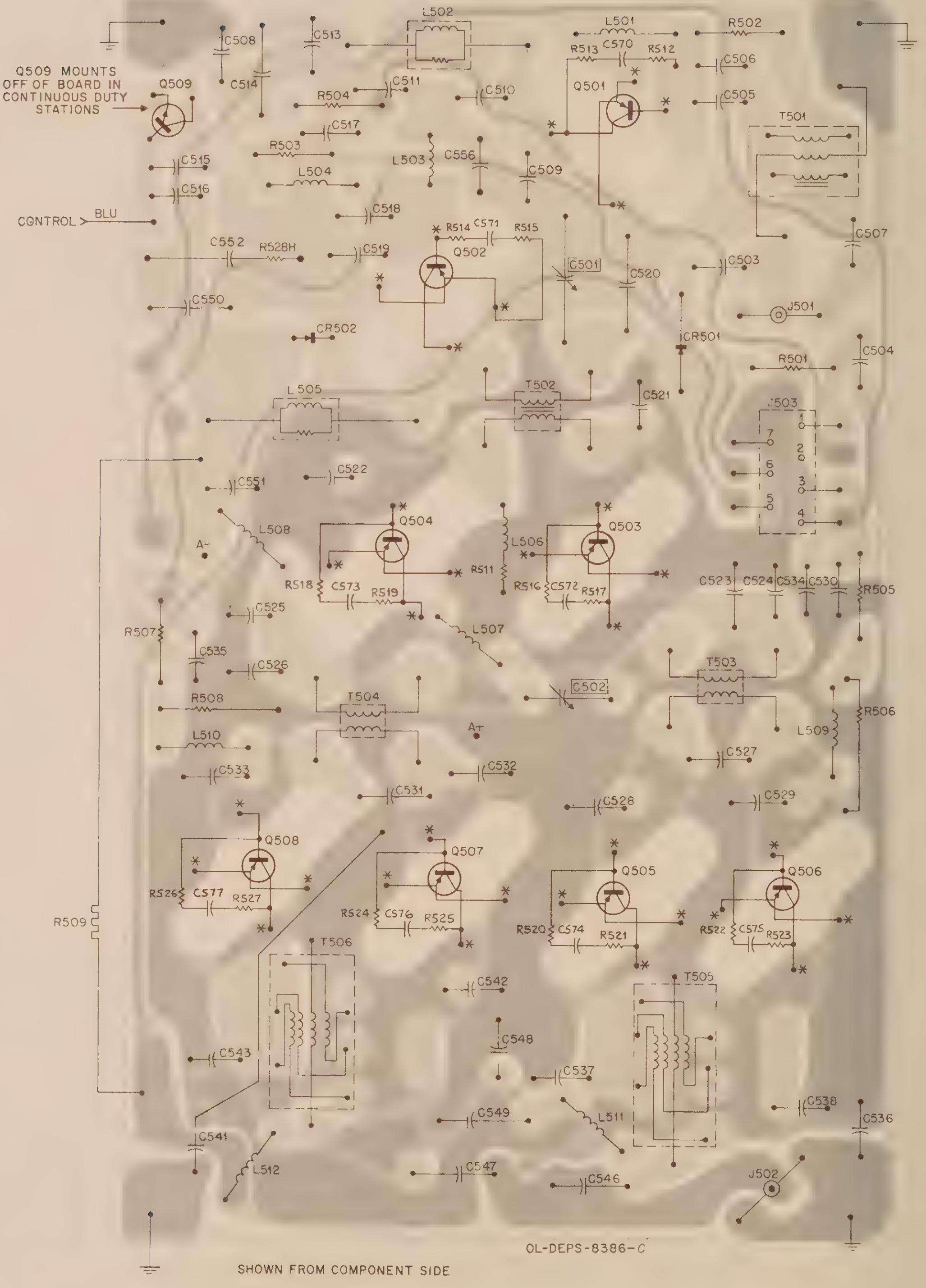
STEP	ADJUST	METERING PLUG LOCATION	SELECTOR SWITCH POSITION	METER REV. & ADAPTER CABLE REF. SWITCHES (SEE NOTE)	STAGE AND PROCEDURE
1					Align the exciter.
2					For complete power amplifier tune-up, proceed with step 3. To check alignment move metering plug to power control board and go to step 6.
3	C501, C502				PA PRE-ALIGNMENT - Set C501 fully clockwise and C502 to maximum capacity (plate fully meshed).
4	POWER SET	POWER CONTROL BOARD	Wattmeter or 1 AND METER REV. REF B	METER REV. REF A	OUTPUT-Move the metering plug to the power control board. Without exceeding rated power output of 90, 100, or 110 watts on the wattmeter or calibration label value on meter 1, adjust the POWER SET control for rated power or until no further increase in power output is observed. If meter 5 reads 15-25 uA, go to step 5. If meter 5 reads above 25 uA, then adjust the POWER SET control counterclockwise until meter 5 is between 15-25 uA.

POWER AMPLIFIER ALIGNMENT PROCEDURE (CONT'D)

STEP	ADJUST	METERING PLUG LOCATION	SELECTOR SWITCH POSITION	METER REV. & ADAPTER CABLE REF. SWITCHES (SEE NOTE)	STAGE AND PROCEDURE
5	C501, C502	POWER CONTROL BOARD	5	METER REV. REF B	PA DRIVER OUTPUT - Tune C501, then C502 for a minimum meter 5 reading.
6	POWER SET	POWER CONTROL BOARD	Wattmeter or 1	METER REV. REF A	OUTPUT - Adjust the POWER SET control for rated power output and perform step 5. (If rated power cannot be attained, repeat steps 4 and 5.)
			5	METER REV. REF B	Check meter 5 reading, it must not exceed 50 uA.
7		PA	5	METER REV. REF B	FINAL COLLECTOR CURRENT - Move the metering plug to the PA. Measure the final collector current (I_c). I_c in amperes is the meter 5 reading (0-50) x 1/2.
8		PA	6	METER REV. REF B	FINAL COLLECTOR VOLTAGE - Measure the final collector voltage (V_c). V_c is the meter 6 reading (0-30 volt scale).
9					Determine final input power (P_{in}). P_{in} equals $V_c \times I_c$. P_{in} should be less than: 180 watts for 90-watt models; 200 watts for 100-watt continuous duty models and 110-watt intermittent duty models.

TRANSISTOR DETAILS
(TOP VIEW)



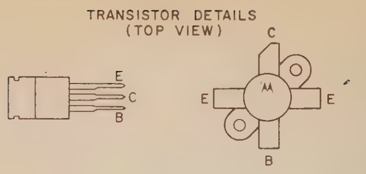

L502
L501
R502
C513
C508
R513
C570
R512
C506
Q509 MOUNTS OFF OF BOARD IN CONTINUOUS DUTY STATIONS
Q509
C514
C511
R504
C510
Q501
C505
T501
C517
R503
L503
C556
C509
C515
L504
C516
CONTROL
BLU
C518
R514
C571
R515
C552
R528H
C519
Q502
C501
C520
C503
C507
C550
CR502
J501
CR501
R501
C504
L505
T502
C521
J503
1
7
2
6
3
5
4
C522
C551
Q504
Q503
L508
L506
A−
R511
R518
C573
R519
R516
C572
R517
C523
C524
C534
C530
R505
C525
L507
R507
C535
C526
T503
T504
C502
R508
R506
L509
A+
L510
C527
C533
C532
C531
C528
C529
Q508
Q507
Q505
Q506
R526
C577
R527
R524
C576
R525
R520
C574
R521
R522
C575
R523
R509
T506
T505
C542
C548
C543
C537
C538
C536
L511
C549
C541
L512
C547
C546
J502

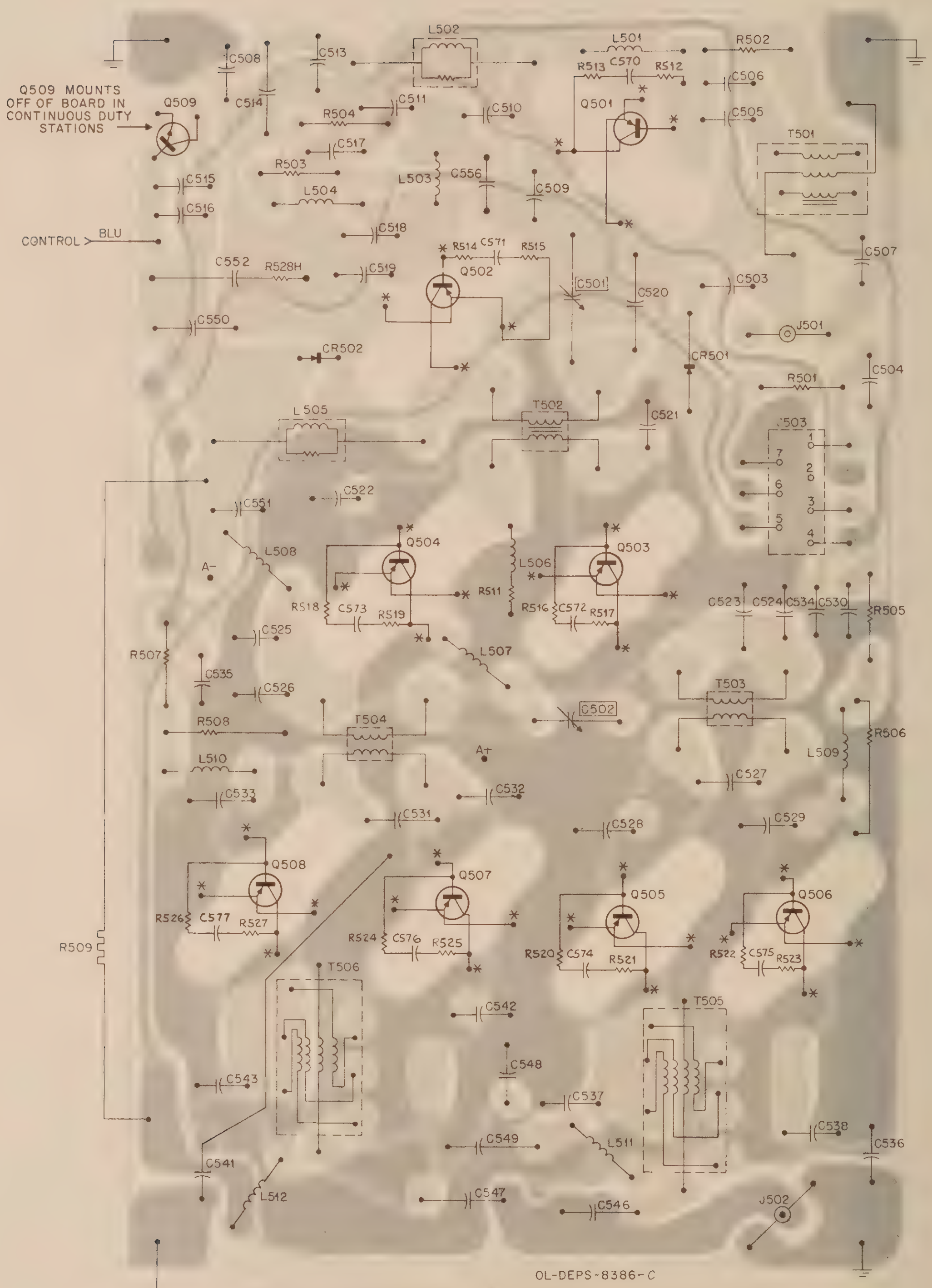
OL-DEPS-8386-C

SHOWN FROM COMPONENT SIDE

* THESE TRANSISTOR LEADS ARE CONNECTED TO ONLY THE COMPONENT SIDE OF THE BOARD

90/100/110 W Power Amplifier
Circuit Board Detail
Motorola No. PEPS-18126-A
1/12/77-UP

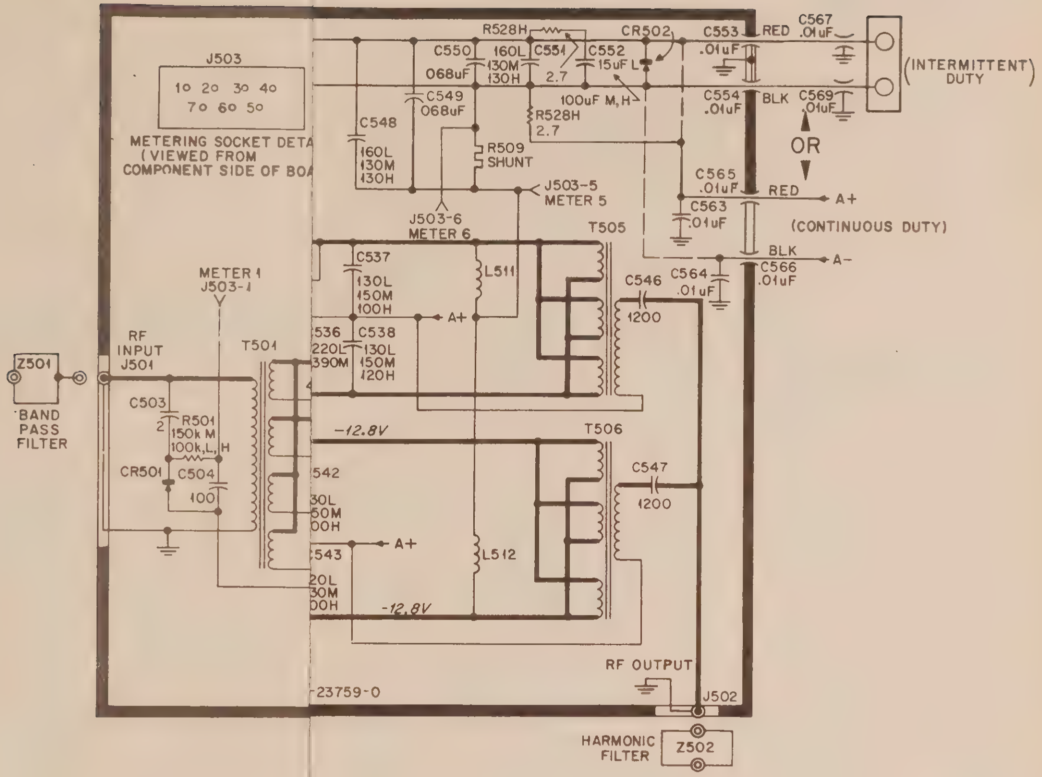

TRANSISTOR DETAILS
(TOP VIEW)
E
C
B
C
E
E
B


Q509 MOUNTS OFF OF BOARD IN CONTINUOUS DUTY STATIONS
Q509
CONTROL
BLU
C508
C513
C514
L502
L501
R502
R513
C570
R512
C506
C505
C511
R504
C510
Q501
C517
R503
T501
C515
C516
L504
L503
C556
C509
C518
R514
C571
R515
C507
C552
R528H
C519
Q502
C501
C520
C503
C550
J501
CR502
CR501
C504
R501
L505
T502
C521
J503
C522
C551
L508
A-
Q504
L506
Q503
R518
C573
R519
R511
R516
C572
R517
C523
C524
C534
C530
R505
C525
R507
L507
C535
C526
T503
C502
R508
T504
L509
R506
A+
L510
C527
C533
C532
C531
C528
C529
Q508
Q507
Q505
Q506
R526
C577
R527
R524
C576
R525
R520
C574
R521
R522
C575
R523
R509
T506
C542
T505
C548
C543
C537
C538
C549
L511
C536
C541
L512
C547
J502
C546
OL-DEPS-8386-C

SHOWN FROM COMPONENT SIDE

* THESE TRANSISTOR LEADS ARE CONNECTED TO ONLY THE COMPONENT SIDE OF THE BOARD

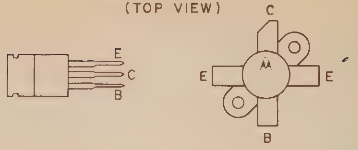
90/100/110 W Power Amplifier
Circuit Board Detail
Motorola No. PEPS-18126-A
1/12/77-UP

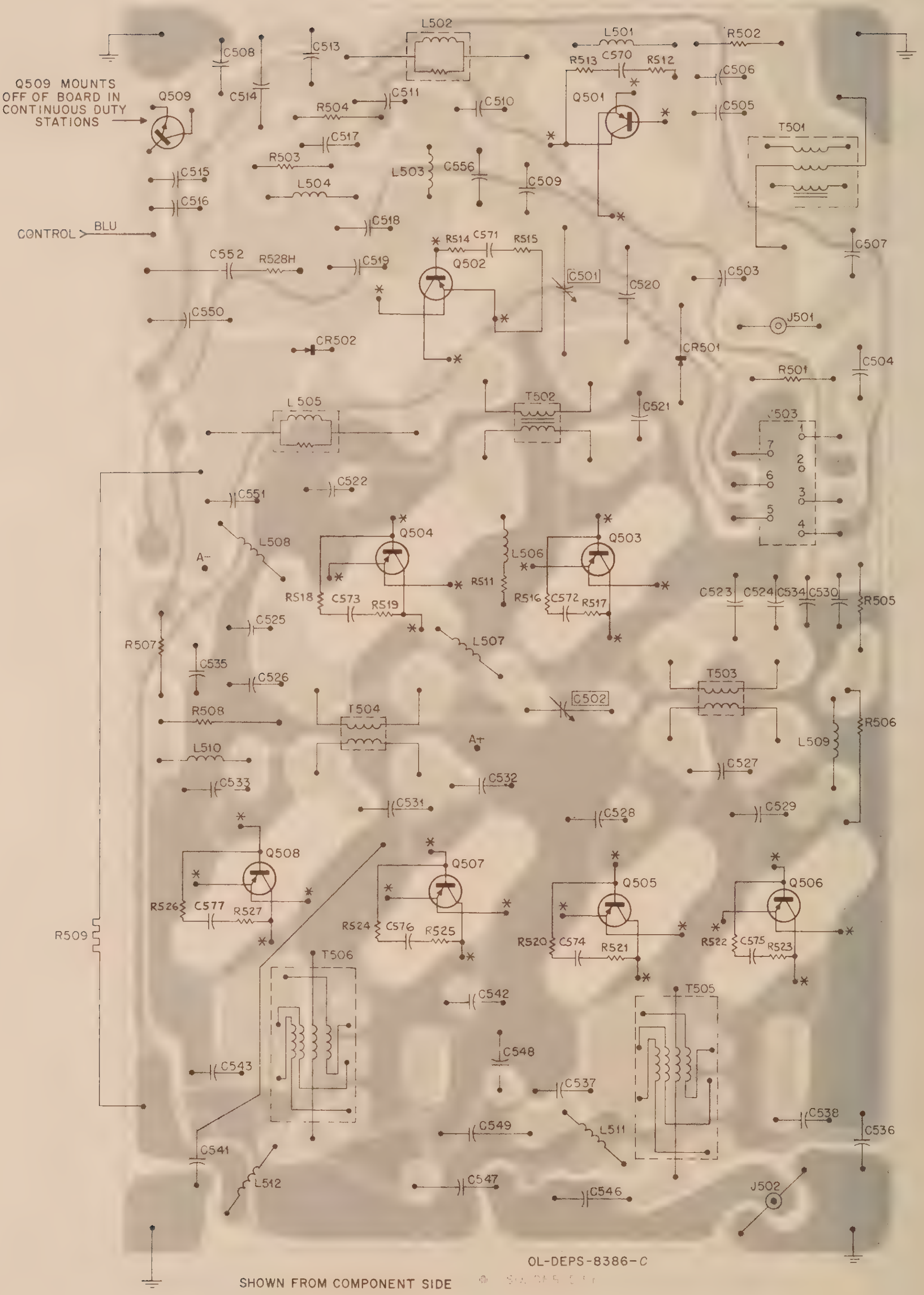

R528H
CR502
C553
RED
C567
.01uF
C550
068uF
160L
130M
130H
C551
C552
15uF L
2.7
.01uF
(INTERMITTENT)
DUTY
J503
10 20 30 40
70 60 50
C549
068uF
100uF M,H
R528H
2.7
C554
.01uF
BLK
C569
.01uF
OR
C548
160L
130M
130H
METERING SOCKET DETA
(VIEWED FROM
COMPONENT SIDE OF BOA
R509
SHUNT
J503-5
METER 5
C565
.01uF
RED
A+
C563
.01uF
(CONTINUOUS DUTY)
J503-6
METER 6
T505
BLK
A-
C537
130L
150M
100H
L511
C546
C564
.01uF
C566
.01uF
METER 1
J503-1
A+
1200
RF
INPUT
J501
T501
536
220L
390M
C538
130L
150M
120H
Z501
BAND
PASS
FILTER
C503
2
R501
150k M
100k,L,H
-12.8V
T506
CR501
C504
100
542
30L
50M
00H
C547
1200
543
A+
L512
20L
30M
00H
-12.8V
RF OUTPUT
-23759-0
J502
HARMONIC
FILTER
Z502

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

90/100/110 W Power Amplifier
Schematic Diagram
Motorola No. PEPS-23760-O
8/9/77-UP

TRANSISTOR DETAILS
(TOP VIEW)



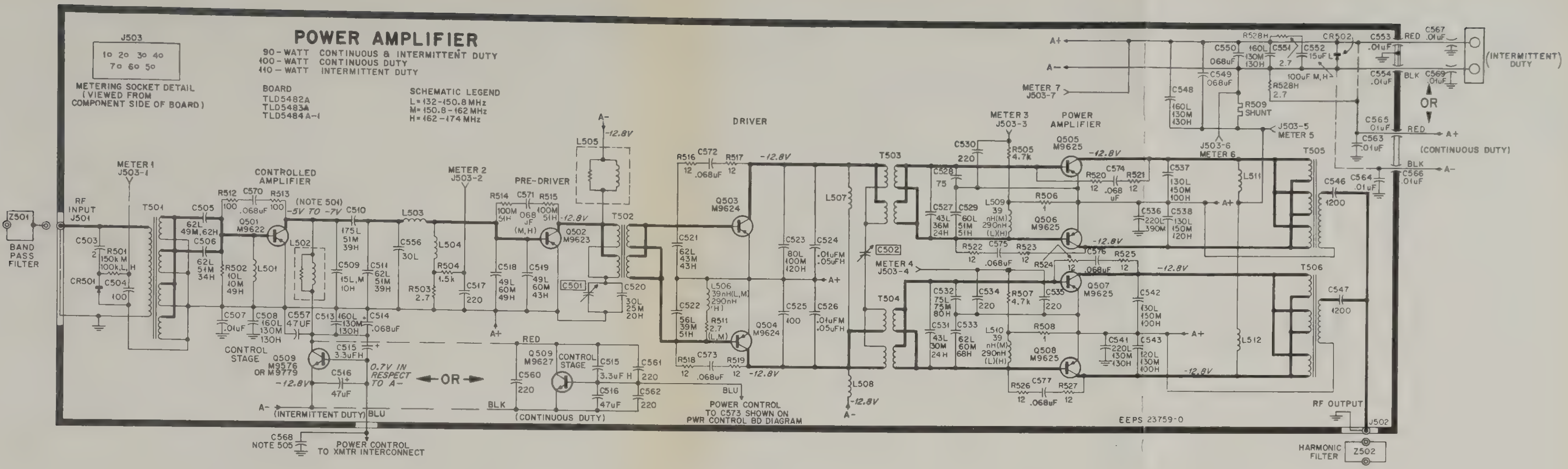

Q509 MOUNTS OFF OF BOARD IN CONTINUOUS DUTY STATIONS
Q509
C508
C514
C513
L502
L501
R502
R513
C570
R512
C506
C505
C511
R504
C510
Q501
T501
C517
R503
L503
C556
C509
C515
C516
L504
CONTROL
BLU
C518
C552
R528H
C519
R514
C571
R515
Q502
C501
C520
C503
C507
C550
J501
CR502
CR501
C504
R501
L505
T502
C521
J503
1
2
3
4
5
6
7
C551
C522
L508
A-
Q504
L506
Q503
R511
R518
C573
R519
R516
C572
R517
C523
C524
C534
C530
R505
C525
L507
R507
C535
C526
T503
C502
R508
T504
R506
A+
L509
L510
C527
C533
C532
C531
C528
C529
Q508
Q507
Q505
Q506
R526
C577
R527
R509
R524
C576
R525
R520
C574
R521
R522
C575
R523
T506
T505
C542
C548
C543
C537
C538
C536
C549
L511
C541
L512
C547
C546
J502

OL-DEPS-8386-C

SHOWN FROM COMPONENT SIDE

* THESE TRANSISTOR LEADS ARE CONNECTED TO ONLY THE COMPONENT SIDE OF THE BOARD

90/100/110 W Power Amplifier
Circuit Board Detail
Motorola No. PEPS-18126-A
1/12/77-UP


POWER AMPLIFIER
90-WATT CONTINUOUS & INTERMITTENT DUTY
100-WATT CONTINUOUS DUTY
110-WATT INTERMITTENT DUTY
BOARD
TLD5482A
TLD5483A
TLD5484A-1
SCHEMATIC LEGEND
L=132-150.8 MHz
M=150.8-162 MHz
H=162-174 MHz
J503
10 20 30 40
70 60 50
METERING SOCKET DETAIL (VIEWED FROM COMPONENT SIDE OF BOARD)
Z501
BAND PASS FILTER
RF INPUT J501
METER 1 J503-1
CONTROLLED AMPLIFIER
(NOTE 504)
-5V TO -7V
Q501 M9622
METER 2 J503-2
PRE-DRIVER
Q502 M9623
DRIVER
Q503 M9624
Q504 M9624
METER 3 J503-3
POWER AMPLIFIER
Q505 M9625
Q506 M9625
Q507 M9625
Q508 M9625
METER 4 J503-4
METER 5 J503-5
METER 6 J503-6
METER 7 J503-7
R509 SHUNT
CR502
(INTERMITTENT DUTY)
(CONTINUOUS DUTY)
OR
RED
BLK
BLU
A+
A-
-12.8V
CONTROL STAGE
Q509 M9576 OR M9779
Q509 M9627
0.7V IN RESPECT TO A-
(INTERMITTENT DUTY)
(CONTINUOUS DUTY)
POWER CONTROL TO C573 SHOWN ON PWR CONTROL BD DIAGRAM
C568 NOTE 505
POWER CONTROL TO XMTR INTERCONNECT
RF OUTPUT
J502
HARMONIC FILTER
Z502
EEPS 23759-0

POWER AMPLIFIERS

501. VOLTAGES DEPENDENT UPON AMOUNT OF CUTBACK FROM POWER CONTROL BOARD.
502. VOLTAGES MEASURED IN RESPECT TO A+ UNLESS OTHERWISE SPECIFIED.
503. UNLESS OTHERWISE SPECIFIED: CAPACITOR VALUES ARE IN PICOFARADS.
504. THE CONTROL STAGE TRANSISTOR IS BOARD-MOUNTED FOR INTERMITTENT DUTY OPERATION AND CHASSIS-MOUNTED FOR CONTINUOUS DUTY OPERATION.
505. C568 IS PART OF TRANSMITTER CHASSIS & HARDWARE KIT.

EPS-8362-O

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

90/100/110 W Power Amplifier
Schematic Diagram
Motorola No. PEPS-23760-O
8/9/77-UP

RENCE MBOL	MOTOROLA PART NO.	DESCRIPTION
	21-84494B35	60
	21-84494B34	68
35	21-83596E10	220
	21-84494B12	220
	21-84494B18	390
		NOT USED
	21-84395B05	130
	21-84395B06	150
	21-84395B02	100
	21-84395B05	130
	21-84395B06	150
	21-84395B04	120
	21-84494B12	220
, 541H	21-84494B26	130
	21-84395B05	130
	21-84395B06	150
	21-84395B02	100
	21-84395B04	120
	21-84395B05	130
	21-84395B02	100
47	21-84426B36	1200
	21-84494B51	160
, 548H	21-84494B26	130
	21-84494B51	160
, 551H	21-84494B26	130
	23-83214C02	15 uF ±20%; 25 V
	23-84669A19	100 uF +150-10%; 20 V
	23-82783B04	100 uF ±20%; 25 V
	21-84494B33	30
	21-84494B29	10
	21-84494B74	6
	23-82783B25	4.7 uF ±10%; 25 V
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
	48-82139G01	germanium
	48-82525G01	silicon
		CONNECTOR, receptacle:
		female:
02	28-84227B01	coaxial; miniature type
	9-84207B01	7-contact
		COIL, RF:
	24-83961B01	choke; 3 turns; coded BRN
	24-84392B03	choke; 6 turns
	7-84400B03	inductor "bracket"
, 503H	24-83884G03	1-1/2 turns
, 504M	24-83961B03	choke; 1 turn; coded WHT
	24-82723H18	choke; 85 nH
	24-84392B02	choke; 4 turns
, 506M	24-82723H02	choke; 39 nH
	24-82723H20	choke; 290 nH
. 508L	24-83547G10	choke; 2-1/2 turns
, 507H	24-84393B02	choke; 4-1/2 turns
, 508H	24-84393B02	choke; 4-1/2 turns
510L	24-82723H04	choke; 0.29 uH
	24-82723H02	choke; 39 nH
	24-82723H02	choke; 39 nH
510H	24-82723H20	choke; 290 nH
		RESISTOR, fixed: ±10%; 1/4 W; unless otherwise stated
	6-124D02	150k
. 502M	6-124C01	10
	6-124C17	47
	6-124B55	2.7 ±5%
	6-124C53	1.5k
07	6-124C65	4.7k
08	6-125D70	1; 1/2 W
	6-84232B01	(meter shunt)
, 511M	6-124D55	2.7 ±5%
	6-124D55	2.7 ±5%
		TRANSFORMER, RF:
	25-84396B01	pri: 5 turns sec: 4 windings, 1 turn each
	25-84397B01	pri: 2 windings, 1-3/4 turns each sec: 2 windings, 1-3/4 turns each
	24-84302C01	pri: 2 windings, 2-3/4 turns each sec: 2 windings, 2-3/4 turns each NOTE: ("Left hand" windings)
	24-84464D01	pri: 3-3/4 turns sec: 3-3/4 turns
	24-82060L01	pri: 2 windings, 2 turns each sec: 2 windings, 2 turns each

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
T504L	24-84302C02	pri: 2 windings, 2-3/4 turns each sec: 2 windings, 2-3/4 turns each NOTE: ("Right hand" windings)
T504M	24-84464D01	pri: 3-3/4 turns sec: 3-3/4 turns
T504H	24-82060L01	pri: 2 windings, 2 turns each sec: 2 windings, 2 turns each
T505L, 505M	25-84812B01	pri: 3 windings, 1-1/2 turns each sec: 6 turns
T505H	25-84398B01	pri: 3 windings, 1-1/2 turns each sec: 5 turns
T506L, 506M	25-84812B01	pri: 3 windings, 1-1/2 turns each sec: 6 turns
T506H	25-84398B01	pri: 3 windings, 1-1/2 turns each sec: 5 turns

PA Output (Harmonic) Filter PL-1722-O

		FILTER, RF: low pass;
Z502L	TFD6101A	132-150.8 MHz
Z502M, 502H	TFD6102A	150.8-174 MHz

TLN5074A Terminal Bracket Kit
(Intermittent Duty) PL-1856-O

		CAPACITOR, fixed:
C567, 569	21-84211B01	.01 uF +100-0%; 250 V

NOTE: Hardware for TLN5074A is listed in the Transmitter Hardware Kits section.

TLD8069A Resistor-Capacitor Network Kit (132-150.8 MHz)
TRN6445A Resistor-Capacitor Network Kit (150.8-162 MHz)
TLD5502A Resistor-Capacitor Network Kit
(162-174 MHz) PL-5396-O

		CAPACITOR, fixed:
C570, 572 thru 577	8-83813H05	.068 uF ±10%; 100 V
C571L		Not Used
C571M, 571H	8-83813H05	.068 uF ±10%; 100 V
		RESISTOR, fixed:
R512, 513	6-125C25	100 ±10%; 1/2 W
R514L, 515L		Not Used
R514M, 515M	6-125C25	100 ±10%; 1/2 W
R514H, 515H	6-125A18	51 ±5%; 1/2 W
R516 thru 527	6-125C03	12 ±10%; 1/2 W

60 W POWER AMPLIFIER

MODEL TABLE

MODEL	FREQUENCY RANGE	APPLICATION
TLD1673A	150.8-162 MHz	Intermittent Duty
TLD1674A	162-174 MHz	
TLD1703B/C	150.8-162 MHz	Continuous Duty
TLD1704B/C	162-174 MHz	

TECHNICAL CHARACTERISTICS*

RF Power In	400 mW
Input Impedance	50 ohms
RF Power Out	60 watts (50 watts optional)
Output Impedance	50 ohms
Power Requirements	13.0 volts @11 amps

*All values are typical

1. DESCRIPTION

Motorola's TLD1670A and TLD1700B/C Series Power Amplifiers provide the following features:

- A minimum of 60 W rf output (50 W optional).

- All circuitry contained on one double-sided circuit board.

- Power transistors (and control stage transistor in continuous duty stations) mounted directly to (but electrically isolated from) the heat sink.

- RF connections made through two coaxial connections which plug directly into the input and output.

- DC power supplied via two feedthrough capacitors that also provide filtering.

- Input, output, and most other critical interstage matching is accomplished by the use of rf transformers wound around ferrite cores. Only one tuning adjustment is required dur to the relatively broadband matching characteristics of the ferrite transformers and the low inductance leads of the silicon opposed emitter transistors.

MOTOROLA INC.
Communications Division

service publications
1301 E. Algonquin Road, Schaumburg, IL 60196

PARTS LIST

TLN4728A Xmtr. Chassis & Heat Sink
(Intermittent Duty) (part of TLD1680 Series) PL-1717-D

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITOR, fixed:
[illegible]	21-84211B01	.01 uF +100-0%; 250 V
[illegible]	23-83210A08	100 uF +150-10%; 25 V
[illegible]	21-84211B01	.01 uF +100-0%; 250 V
[illegible]	21-82880E19	500 pF ±10%; 500 V
[illegible]	21-84211B01	.01 uF +100-0%; 250 V
		TRANSISTOR: (SEE NOTE)
Q501	48-869622	P-N-P; type M9622
Q502	48-869623	P-N-P; type M9623
Q503, 504	48-869624	P-N-P; type M9624
Q505 thru 508	48-869625	P-N-P; type M9625
Q509	48-869576 or 48-869779	N-P-N; type M9576 N-P-N; type M9779

NOTE: Additional electrical components for TLN4728A are listed in the Transmitter Interconnect section; hardware is listed in the Transmitter Hardware Kits section.

TLN4741A PA Hardware Kit
(Continuous Duty) (part of TLD1690 Series) PL-1718-C

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		TRANSISTOR: P-N-P; (SEE NOTE)
Q501	48-869622	type M9622
Q502	48-869623	type M9623
Q503, 504	48-869624	type M9624
Q505 thru 508	48-869625	type M9625

NOTE: Additional electrical components for TLN4741A are listed in the Power Control section; hardware is listed in the Transmitter Hardware Kits section.

TLN4780A PA Casting & Hardware Kit
(Gontinuous Duty) (part of TLD1690 Series) PL-1719-B

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITOR, fixed:
[illegible]	21-84211B02	.01 uF +100-0%; 250 V

NOTE: Hardware for TLN4780A is listed in the Transmitter Hardware Kits section.

Exciter Output Filter PL-1721-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		FILTER, RF: bandpass;
Z501L	TFD6111A	132-150.8 MHz
Z501M, 501H	TFD6112A	150.8-174 MHz

TLN4822A Cable & Bracket Kit
(Continuous Duty) (part of TLD1690 Series) PL-1720-B

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITOR, fixed:
[illegible]	21-410115	220 pF ±20%;
[illegible]	21-84463D01	.001 uF ±20%; 500 V
		TRANSISTOR: (SEE NOTE)
[illegible]	48-869627	N-P-N; type M9627

NOTE: Cable assemblies for TLN4822A are listed in the RF Cables section; additional electrical components are listed in the Transmitter Interconnect section; hardware is listed in the Transmitter Hardware Kits section.

POWER AMPLIFIER (INTERMITTENT DUTY)
TLD1682A (132-150.8 MHz)
TLD1683B (150.8-162 MHz)
TLD1684B (162-174 MHz)

POWER AMPLIFIER (CONTINUOUS DUTY)

TLD1692C (132-150.8 MHz)
TLD1693C (150.8-162 MHz)
TLD1694C (162-174 MHz)

LEGEND:
L = 132-150.8 MHz
M = 150.8-162 MHz
H = 162-174 MHz

TLD5482A PA Board (132-150.8 MHz)
TLD5483A PA Board (150.8-162 MHz)
TLD5484A PA Board (162-174 MHz) PL-5395-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: pF; ±5%; 500 V; unless otherwised stated
C501L	20-83201B09	variable: 4-40
C502M, 502H	20-83201B07	variable: 1.5-18
C502L	19-83491E08	variable: 2.4-27 (voltage not stated)
C502M, 502H	19-83491E07	variable: 2-19.3 (voltage not stated)
C503	21-83406D52	2
C504	21-84494B04	100
C505L	21-84494B02	62
C505M	21-84494B25	49
C505H	21-84494B02	62
C506L	21-84494B02	62
C506M	21-84494B01	51
C506H	21-84494B30	34
C507	21-82428B59	.01 uF +80-20%; 200 V
C508L	21-84494B51	160
C508M, 508H	21-84494B26	130
C509L	21-84494B38	15
C509M	21-84494B38	15
C509H	21-84494B29	10
C510L	21-84494B09	175
C510M	21-84494B01	51
C510H	21-84494B24	39
C511L	21-84494B02	62
C513L	21-84494B51	160
C513M, 513H	21-84494B26	130
C514, 549, 550	8-83813H05	.068 uF ±10%; 100 V
C515L, 515M		NOT USED
C515H	23-83214C17	3.3 uF ±20%; 15 V
C516	23-83214C10	47 uF ±20%; 6 V
C517	21-83596E10	220
C518L	21-84494B25	49
C518M	21-84494B35	60
C518H	21-84494B25	49
C519L	21-84494B25	49
C519M	21-84494B35	60
C519H	21-84494B28	43
C520L	21-84936A06	30 ±1.5 pF; 2000 V
C520M	21-84936A04	25; 2000 V
C520H	21-84936A03	20; 2000 V
C521L	21-84494B02	62
C521M, 521H	21-84494B28	43
C522L	21-84494B45	56
C522M	21-84494B24	39
C522H	21-84494B01	51
C523L	21-84395B03	80
C523M	21-84395B02	100
C523H	21-84395B04	120
C524L, 526L		NOT USED
C524M, 526M	21-82428B59	.01 uF +80-20%; 200 V
C524H, 526H	21-82372C04	.05 uF +80-20%; 25 V
C525	21-84395B02	100
C527L	21-84494B28	43
C527M	21-84494B43	36
C527H	21-84494B41	24
C528L	21-84494B31	75
C528M	21-84494B31	75
C528H	21-84494B03	80
C529L	21-84494B35	60
C529M, 529H	21-84494B01	51
C530	21-83596E10	220
C531L	21-84494B28	43
C531M	21-84494B43	36
C531H	21-84494B41	24
C532L	21-84494B31	75
C532M	21-84494B31	75
C532H	21-84494B03	80
C533L	21-84494B02	62
C533M	21-84494B35	60
C533H	21-84494B34	68
C534, 535	21-83596E10	220
C536L	21-84494B12	220
C536M	21-84494B18	390
C536H		NOT USED
C537L	21-84395B05	130
C537M	21-84395B06	150
C537H	21-84395B02	100
C538L	21-84395B05	130
C538M	21-84395B06	150
C538H	21-84395B04	120
C541L	21-84494B12	220
C541M, 541H	21-84494B26	130
C542L	21-84395B05	130
C542M	21-84395B06	150
C542H	21-84395B02	100
C543L	21-84395B04	120
C543M	21-84395B05	130
C543H	21-84395B02	100
C546, 547	21-84426B36	1200
C548L	21-84494B51	160
C548M, 548H	21-84494B26	130
C551L	21-84494B51	160
C551M, 551H	21-84494B26	130
C552L	23-83214C02	15 uF ±20%; 25 V
C552M	23-84669A19	100 uF +150-10%; 20 V
C552H	23-82783B04	100 uF ±20%; 25 V
C556L	21-84494B33	30
C556M	21-84494B29	10
C556H	21-84494B74	6
C557	23-82783B25	4.7 uF ±10%; 25 V
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR501	48-82139G01	germanium
CR502	48-82525G01	silicon
		CONNECTOR, receptacle: female:
T501, 502	28-84227B01	coaxial; miniature type
J503	9-84207B01	7-contact
		COIL, RF:
L501	24-83961B01	choke; 3 turns; coded BRN
L502	24-84392B03	choke; 6 turns
L503L	7-84400B03	inductor "bracket"
L503M, 503H	24-83884G03	1-1/2 turns
L504L, 504M	24-83961B03	choke; 1 turn; coded WHT
L504H	24-82723H18	choke; 85 nH
L505	24-84392B02	choke; 4 turns
L506L, 506M	24-82723H02	choke; 39 nH
L506H	24-82723H20	choke; 290 nH
L507L, 508L	24-83547G10	choke; 2-1/2 turns
L507M, 507H	24-84393B02	choke; 4-1/2 turns
L508M, 508H	24-84393B02	choke; 4-1/2 turns
L509L, 510L	24-82723H04	choke; 0.29 uH
L509M	24-82723H02	choke; 39 nH
L510M	24-82723H02	choke; 39 nH
L509H, 510H	24-82723H20	choke; 290 nH
		RESISTOR, fixed: ±10%; 1/4 W; unless otherwise stated
R501	6-124D02	150k
R502L, 502M	6-124C01	10
R502H	6-124C17	47
R503	6-124B55	2.7 ±5%
R504	6-124C53	1.5k
R505, 507	6-124C65	4.7k
R506, 508	6-125D70	1; 1/2 W
R509	6-84232B01	(meter shunt)
R511L, 511M	6-124D55	2.7 ±5%
R528H	6-124D55	2.7 ±5%
		TRANSFORMER, RF:
T501	25-84396B01	pri: 5 turns sec: 4 windings, 1 turn each
T502	25-84397B01	pri: 2 windings, 1-3/4 turns each sec: 2 windings, 1-3/4 turns each
T503L	24-84302C01	pri: 2 windings, 2-3/4 turns each sec: 2 windings, 2-3/4 turns each NOTE: ("Left hand" windings)
T503M	24-84464D01	pri: 3-3/4 turns sec: 3-3/4 turns
T503H	24-82060L01	pri: 2 windings, 2 turns each sec: 2 windings, 2 turns each
T504L	24-84302C02	pri: 2 windings, 2-3/4 turns each sec: 2 windings, 2-3/4 turns each NOTE: ("Right hand" windings)
T504M	24-84464D01	pri: 3-3/4 turns sec: 3-3/4 turns
T504H	24-82060L01	pri: 2 windings, 2 turns each sec: 2 windings, 2 turns each
T505L, 505M	25-84812B01	pri: 3 windings, 1-1/2 turns each sec: 6 turns
T505H	25-84398B01	pri: 3 windings, 1-1/2 turns each sec: 5 turns
T506L, 506M	25-84812B01	pri: 3 windings, 1-1/2 turns each sec: 6 turns
T506H	25-84398B01	pri: 3 windings, 1-1/2 turns each sec: 5 turns

PA Output (Harmonic) Filter PL-1722-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		FILTER, RF: low pass;
Z502L	TFD6101A	132-150.8 MHz
Z502M, 502H	TFD6102A	150.8-174 MHz

TLN5074A Terminal Bracket Kit
(Intermittent Duty) PL-1856-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C567, 569	21-84211B01	.01 uF +100-0%; 250 V

NOTE: Hardware for TLN5074A is listed in the Transmitter Hardware Kits section.

TLD8069A Resistor-Capacitor Network Kit (132-150.8 MHz)
TRN6445A Resistor-Capacitor Network Kit (150.8-162 MHz)
TLD5502A Resistor-Capacitor Network Kit
(162-174 MHz) PL-5396-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C570, 572 thru 577	8-83813H05	.068 uF ±10%; 100 V
C571L		Not Used
C571M, 571H	8-83813H05	.068 uF ±10%; 100 V
		RESISTOR, fixed:
R512, 513	6-125C25	100 ±10%; 1/2 W
R514L, 515L		Not Used
R514M, 515M	6-125C25	100 ±10%; 1/2 W
R514H, 515H	6-125A18	51 ±5%; 1/2 W
R516 thru 527	6-125C03	12 ±10%; 1/2 W

60 W POWER AMPLIFIER

MODEL TABLE

MODEL	FREQUENCY RANGE	APPLICATION
TLD1673A	150.8-162 MHz	Intermittent Duty
TLD1674A	162-174 MHz	
TLD1703B/C	150.8-162 MHz	Continuous Duty
TLD1704B/C	162-174 MHz	

TECHNICAL CHARACTERISTICS*

RF Power In	400 mW
Input Impedance	50 ohms
RF Power Out	60 watts (50 watts optional)
Output Impedance	50 ohms
Power Requirements	13.0 volts @11 amps

*All values are typical

1. DESCRIPTION

Motorola's TLD1670A and TLD1700B/C Series Power Amplifiers provide the following features:

- A minimum of 60 W rf output (50 W optional).

- All circuitry contained on one double-sided circuit board.

- Power transistors (and control stage transistor in continuous duty stations) mounted directly to (but electrically isolated from) the heat sink.

- RF connections made through two coaxial connections which plug directly into the input and output.

- DC power supplied via two feedthrough capacitors that also provide filtering.

- Input, output, and most other critical interstage matching is accomplished by the use of rf transformers wound around ferrite cores. Only one tuning adjustment is required dur to the relatively broadband matching characteristics of the ferrite transformers and the low inductance leads of the silicon opposed emitter transistors.

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- One metering socket which is accessible from the component side of the circuit board allows four major test points to be monitored and permits measurement of the dc current drawn by the final amplifier stage.

- Due to the heat sink mounting requirements for this board, servicing is accomplished from the component side of the board.

- Diode protection against reverse polarity voltage (board mounted diode).

- Output protection provided by a control stage transistor driven by the power control circuit (Controls gain of the first stage). In intermittent duty stations, a single-wire provides interconnection between power control and PA circuitry. In continuous duty stations, three wires provide this interconnection.

2. FUNCTIONAL OPERATION

Refer to the block diagram, Figure 1, and the schematic diagram. This series of power amplifiers requires a 400 mW rf input from the exciter board. This input is passed through a bandpass filter assembly and a ferrite step-down transformer (to match the input impedance to the first stage) to the gain-controlled amplifier stage. The external power control circuit which drives the control stage transistor determines the gain of this stage. The power control circuit monitors the output of the final stages of the power amplifier, the load condition and the heat sink temperature.

The output of the gain-controlled amplifier is passed through a fixed-tuned broadband, matching network and applied to the pre-driver stage. A parallel capacitor network couples the output of the pre-driver to the base of the driver stage. The output of the driver stage is split by a transformer to drive the push-pull final power amplifier stage. The output from the final stage is stepped up in impedance by a ferrite transformer to provide the 50-ohm output impedance to match the input impedance of the harmonic filter.

Pin 1 of the metering receptacle provides a means of checking the incoming signal from the exciter. Pin 2 permits observation of the drive output of the first stage and an indication of the operation of the pre-driver stage. Pin 3 permits observation of the drive output of the pre-driver stage and an indication of the operation of the driver stage. Pin 4 reflects the drive signal and operation of the two push-pull power amplifier stages. Pin 5 permits observation of the collector currents of the push-pull final amplifier stages. Reference position A on a Motorola Portable Test Set uses pin 7 of the metering socket as an A+ reference against which the outputs of pins 1, 2, 3, and 4 are checked. Switch the test set to reference position B which uses pin 6 as a reference and then switch to meter position 5. This provides a reading across a calibrated resistor through which the current is drawn by the final amplifier stages.

3. MAINTENANCE

a. General

NOTE

Because of the complexity involved and time required to remove the PA board, compared to plug-in boards, it is not recommended that the PA board be removed. Proper troubleshooting techniques will usually locate detective components "on the spot".

This section of the manual provides the maintenance shop procedures for the PA board.

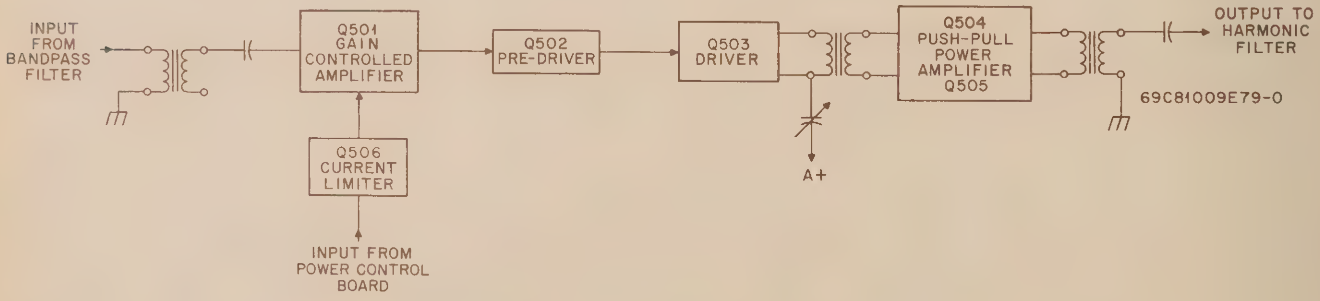

INPUT FROM BANDPASS FILTER
Q501 GAIN CONTROLLED AMPLIFIER
Q502 PRE-DRIVER
Q503 DRIVER
Q504 PUSH-PULL POWER AMPLIFIER Q505
OUTPUT TO HARMONIC FILTER
69C81009E79-0
Q506 CURRENT LIMITER
A+
INPUT FROM POWER CONTROL BOARD

Figure 1. Block Diagram

It assumes that preliminary tests have already localized the trouble to the PA board. These procedures include measurements with optional built-in station metering or a Motorola Portable Test Set, a vom, a complete set of performance tests, and extensive troubleshooting procedures.

CAUTION

The PA board must be installed in the transmitter for testing to provide the necessary power, ground, control, heat sinking and signal connections.

b. Recommended Test Equipment

The following test equipment is the minimum required for troubleshooting and adjusting the PA.

(1) Motorola S1056B through S1059B Portable Test Set and Model TEK-37 or TEK-37A Adapter Cable. The portable test set is required for checking each stage for proper operation. Optional built-in station metering, when incorporated, takes the place of the portable test set.

(2) A Motorola Solid-State DC Multimeter or a 20,000 ohm-per-volt multimeter should be used, however, a low impedance meter is acceptable for dc voltage measurements only.

(3) Motorola T1013A RF Load Resistor (dummy load) or equivalent.

c. Metering

The PA is equipped with a metering receptacle which allows five major test points to be measured. PA metering can be made at each of the five test points by merely rotating a selector switch on the built-in station metering kit or on the test set. A failure in almost any portion of the PA will produce a low or zero meter reading for one or more of the test points. Improper alignment will also cause improper meter readings.

(1) Using the Optional Built-In Station Meter

The optional built-in station metering is similar to the portable test set except PA voltage is measured with the two voltage probes. The built-in metering polarity switch is set to REV for PA metering and FWD for Power Control Board metering.

(a) The entire transmitter is necessary for testing PA boards including the power board for proper control.

(b) The output of the station must be terminated in one of three types of loads:

-- The antenna load.

-- A dummy load such as Motorola's T1013A RF Load Resistor.

-- An RF Wattmeter.

NOTE

A dummy load is preferred to the antenna to eliminate the possibility of shutback by the power control board due to a defective antenna.

(c) Turn the station ON.

(d) With the meter selector switch set to PA position 1 and the mter plug connected to the power amplifier, key the transmitter and observe the meter. Unkey the transmitter. Set the selector switch to positions 2, 3, and 4, keying the transmitter and observing the meter reading for each position. On multi-frequency stations, repeat the readings for each frequency. An analysis of the meter readings for determining whether each circuit is good or bad is given in the MINIMUM PA METER READINGS table.

(2) Using the Portable Test Set

To make the measurements, the portable test set must be connected to the station as follows:

(a) Set the function selector switch of the portable test set to the XMTR position.

(b) Set the meter reversing switch of the test set to the METER REV position.

(c) Set the selector switch of the test set to position 1 and reference position A.

(d) Connect the 20-pin meter cable plug to the test set. When the test set is not in use, disconnect the 20-pin plug to conserve battery life. The plug acts as an on-off switch completing the battery circuit.

(e) Connect the red "control" plug of the adapter cable to the control receptacle on the local or remote control chassis circuit board. Connect the white "metering" plug of the adapter cable to the receptacle on the PA circuit board.

(f) The entire transmitter is necessary for testing PA boards including the power control board for proper control.

(g) The output of the station must be terminated in one of three types of loads:

-- The antenna load.

-- A dummy load such as Motorola's T1013A RF Load Resistor.

-- An RF Wattmeter.

NOTE

A dummy load is preferred to the antenna to eliminate the possibility of shutback by the power control board due to a defective antenna.

(h) Turn the station ON.

(i) Key the transmitter with the XMTR ON button on the test set. Observe the meter. Unkey the transmitter.

(j) Set the selector switch to positions 2, 3, and 4; then switch to reference position B and meter position 5 respectively, keying the transmitter and observing the meter reading for each. On multi-frequency stations repeat the readings for each frequency. An analysis of the meter readings for determining whether each circuit is good or bad follows.

Each time maintenance is performed on the PA the readings should be compared with the previous set of readings. Any degradation of performance will quickly be noted. Often, a lower reading may indicate an impending failure and corrective action may be taken before the circuit fails entirely.

d. Performance Tests

(1) No performance test of the power amplifier is required other than rf power output from the station as a whole. Before checking power output:

(a) The exciter board should be known to be functioning normally.

(b) The power control board should be known to be functioning normally.

(c) Antenna switch should be known to be operating normally (base stations only).

(2) Key the transmitter and observe power out, which should be 60 watts.

(3) If necessary, adjust POWER SET control for rated power output.

CAUTION

The PA shield must always be in place during operation of the station and should be kept in place as much as possible while testing and troubleshooting. The circuit board must always be secured in place with all mounting screws. The transistors (including the control stage transistor mounted on the inner wall) must be secured in place to provide proper heat sinking, and the feedthrough connectors must be soldered in place to provide dc power and good rf grounding.

4. TROUBLESHOOTING

If a problem has been localized to the PA deck, several checks can be made prior to extensive troubleshooting.

a. Visually

Visually check for obvious physical defects such as broken leads, broken plating, broken or disconnected components or overheated parts. Before any attempt is made to change parts, the circuit should be checked to insure that the problem causing the original failure has been identified and corrected, otherwise damage to the new part may occur.

b. Voltage Checks

Check for A+ and A- at the feedthrough connections and for the proper voltage at the collector of each transistor. Certain defects such as broken plating, broken leads, etc. may not be obvious to a visual inspection.

c. Troubleshooting

If test set readings are abnormal or tests indicate subnormal performance, a logical

MINIMUM PA METER READINGS

SELECTOR SWITCH POSITION (See Metering Note)	REFERENCE SWITCH POSITION (Portable Test Set Usage Only)	MINIMUM METER READING	CIRCUIT METERED	IF LOW, THE DEFECTIVE CIRCUIT IS
1	A	15 uA	RF output of exciter and collector voltage of controlled amplifier (PA input)	Exciter, controlled amplifier, or current limiter
2	A	5 uA	Controlled amplifier output	Controlled amplifier or pre-driver
3	A	10 uA	Pre-driver output	Pre-driver or driver
4	A	13 uA	Driver output and power amplifier input	Driver or power amplifier
5	B	25 uA min. 40 uA max.	Final amplifier output current	Final amplifier
6	B	12 V (0-30 V scale)	Final amplifier voltage	Final amplifier A+ or A- input

METERING NOTE

When optional built-in station metering is used in continuous duty stations, only exciter output (PA input), final PA current, and final PA voltage power amplifier functions may be checked. Selector switch position functions change to:

PA CHASSIS SELECTOR SWITCH POSITION	FUNCTION METERED	METER READING
1	PA input	15 uA min.
2	Final PA current	25 uA min, 40 uA max.
3	Final PA voltage	12 V normal
4	Forward power monitor	22-45 uA normal
5	Reflected power monitor	3-8 uA normal
6	Control voltage	3-35 uA normal

troubleshooting procedure is required to isolate the defective component efficiently. The accompanying troubleshooting chart summarizes these results in a logical sequence. A few voltage and resistance checks in the suspected circuit should readily isolate the defective component. Note that all power for the circuits in the PA is from A- referenced to A+ (not to chassis ground, this feature allows operation from positive or negative ground power sources when an optional positive ground converter is used).

CAUTION

Due to the voltage requirements of PNP transistors, all "rf ground" plating is A+ and is "hot" with respect to chassis ground in negative ground applications. Because of this, caution should be used to prevent connection to "ground" plating on the PA board to chassis ground, either directly or by the use of test equipment ground leads. If ac

CAUTION (CONT)

operated test equipment is used, the ground lead must not be electrically connected to ac line ground.

5. PA REPAIR NOTES

a. Resistance Measurement of Transistors in Push-Pull Pairs

Due to the fact that transistors in push-pull pairs are dc connected at the base, emitter and collector, BOTH devices should be measured individually when a defect in the pair is suspected.

b. Transistor Removal Procedure

(1) Unscrew both mounting screws from the base of the transistors. The nuts (for the mounting screws) on the reverse side of the shelf are captivated and will not fall out.

(2) Remove excess solder from around transistor tabs with a vacuum bulb type desoldering device.

(3) Gently lift each tab, one at a time while applying heat.

(4) When all four tabs are loose from the board carefully lift out the transistor.

c. Transistor Installation Procedure

(1) Pre-tin underside of each transistor lead.

(2) Apply a light coat of Wakefield Thermal Compound to the underside of the transistor mounting base and to the heat sink.

(3) Install the transistor making sure that all collector leads face the proper direction. Refer to the circuit board detail.

(4) Screw down the two mounting screws securely.

(5) Solder each transistor lead one at a time to the circuit board. The use of a generous amount of solder will insure a good contact of the entire tab to the board. Use care that solder does not bridge to other plating or that solder does not flow into the cutout in the circuit board.

d. Procedures for Resistance Measurements of Transistors

(1) Set ohmmeter to RX1, RX10, or RX100 scale (preferably RX10 if available).

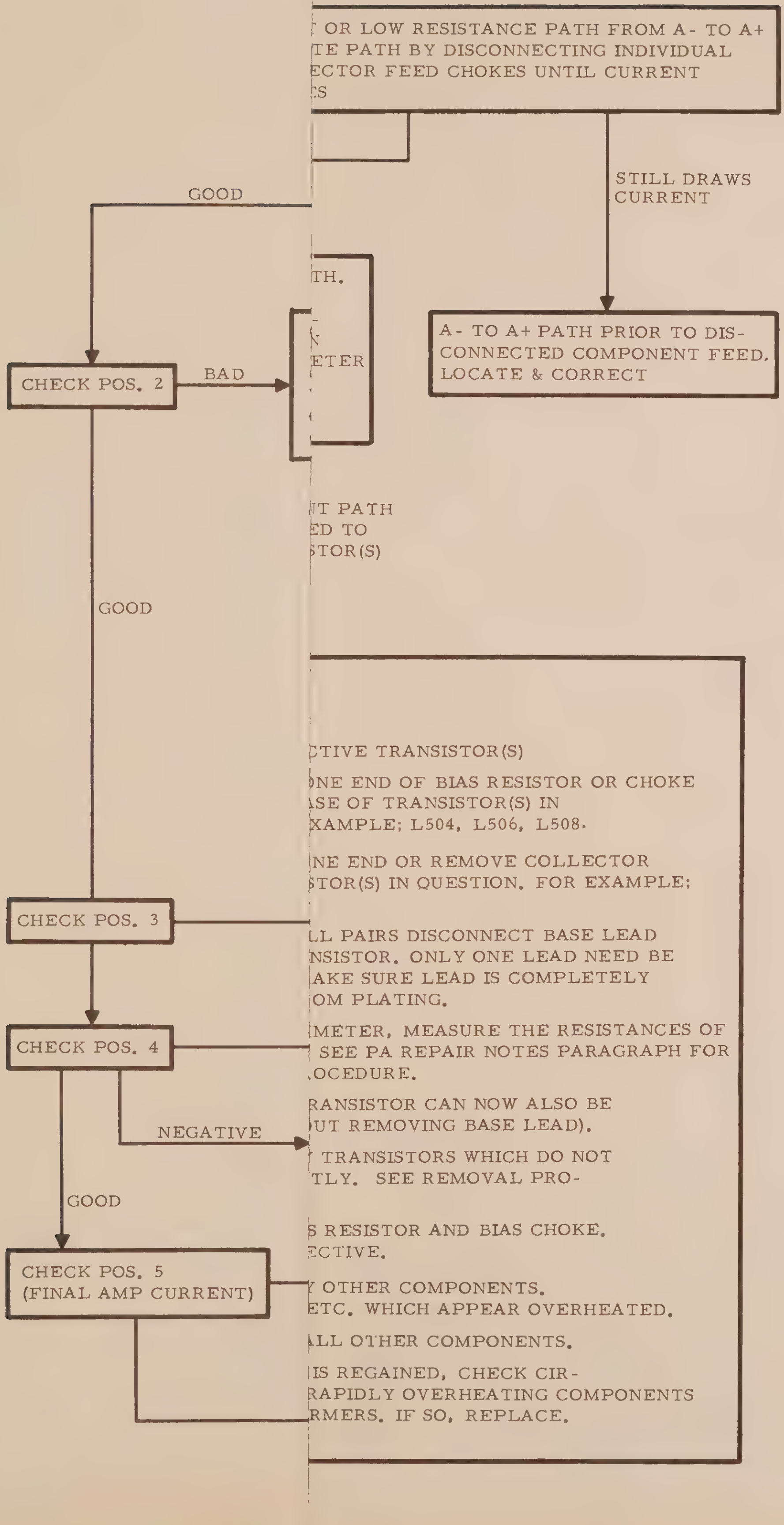
(2) Measure the resistance from lead to lead as described:

(a) With the positive probe on the base, no indication (very high impedance) should be observed when the negative probe is touched to the collector or emitter. (Reverse drop measurement.)

(b) With the negative probe on the base, a relatively low impedance should be observed when touching the positive probe to the collector and emitter. (Forward drop measurement.)

(c) No indication should be observed from collector to emitter regardless of the polarity of the ohmmeter probes.

Should any indication be observed in measurements (a) or (c), the transistor is defective and should be replaced.


T OR LOW RESISTANCE PATH FROM A- TO A+
TE PATH BY DISCONNECTING INDIVIDUAL
ECTOR FEED CHOKES UNTIL CURRENT
CS
STILL DRAWS CURRENT
A- TO A+ PATH PRIOR TO DISCONNECTED COMPONENT FEED. LOCATE & CORRECT
GOOD
TH.
N
ETER
CHECK POS. 2
BAD
NT PATH
ED TO
STOR(S)
GOOD
CTIVE TRANSISTOR(S)
ONE END OF BIAS RESISTOR OR CHOKE
ASE OF TRANSISTOR(S) IN
XAMPLE; L504, L506, L508.
NE END OR REMOVE COLLECTOR
STOR(S) IN QUESTION. FOR EXAMPLE;
CHECK POS. 3
LL PAIRS DISCONNECT BASE LEAD
NSISTOR. ONLY ONE LEAD NEED BE
AKE SURE LEAD IS COMPLETELY
OM PLATING.
METER, MEASURE THE RESISTANCES OF
SEE PA REPAIR NOTES PARAGRAPH FOR
OCEDURE.
CHECK POS. 4
RANSISTOR CAN NOW ALSO BE
UT REMOVING BASE LEAD).
NEGATIVE
TRANSISTORS WHICH DO NOT
TLY. SEE REMOVAL PRO-
GOOD
S RESISTOR AND BIAS CHOKE.
ECTIVE.
CHECK POS. 5 (FINAL AMP CURRENT)
OTHER COMPONENTS.
ETC. WHICH APPEAR OVERHEATED.
ALL OTHER COMPONENTS.
IS REGAINED, CHECK CIR-
RAPIDLY OVERHEATING COMPONENTS
RMERS. IF SO, REPLACE.

CAUTION (CONT)

operated test equipment is used, the ground lead must not be electrically connected to ac line ground.

5. PA REPAIR NOTES

a. Resistance Measurement of Transistors in Push-Pull Pairs

Due to the fact that transistors in push-pull pairs are dc connected at the base, emitter and collector, BOTH devices should be measured individually when a defect in the pair is suspected.

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(2) Apply a light coat of Wakefield Thermal Compound to the underside of the transistor mounting base and to the heat sink.

(3) Install the transistor making sure that all collector leads face the proper direction. Refer to the circuit board detail.

(4) Screw down the two mounting screws securely.

(5) Solder each transistor lead one at a time to the circuit board. The use of a generous amount of solder will insure a good contact of the entire tab to the board. Use care that solder does not bridge to other plating or that solder does not flow into the cutout in the circuit board.

d. Procedures for Resistance Measurements of Transistors

(1) Set ohmmeter to RX1, RX10, or RX100 scale (preferably RX10 if available).

(2) Measure the resistance from lead to lead as described:

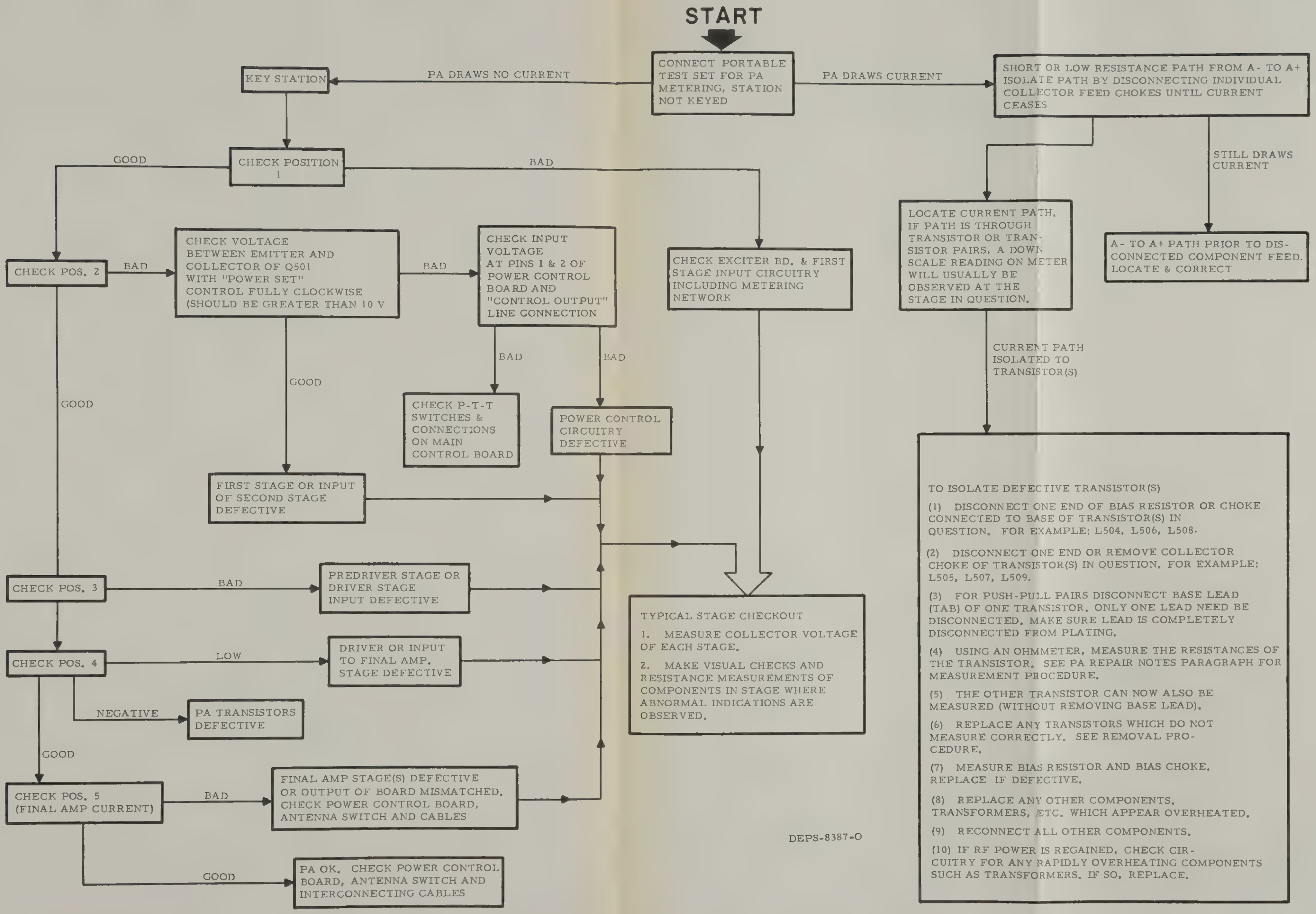
(a) With the positive probe on the base, no indication (very high impedance) should be observed when the negative probe is touched to the collector or emitter. (Reverse drop measurement.)

(b) With the negative probe on the base, a relatively low impedance should be observed when touching the positive probe to the collector and emitter. (Forward drop measurement.)

(c) No indication should be observed from collector to emitter regardless of the polarity of the ohmmeter probes.

Should any indication be observed in measurements (a) or (c), the transistor is defective and should be replaced.

PA TROUBLESHOOTING CHART


START
CONNECT PORTABLE TEST SET FOR PA METERING, STATION NOT KEYED
PA DRAWS NO CURRENT
KEY STATION
PA DRAWS CURRENT
SHORT OR LOW RESISTANCE PATH FROM A- TO A+ ISOLATE PATH BY DISCONNECTING INDIVIDUAL COLLECTOR FEED CHOKES UNTIL CURRENT CEASES
STILL DRAWS CURRENT
A- TO A+ PATH PRIOR TO DISCONNECTED COMPONENT FEED. LOCATE & CORRECT
LOCATE CURRENT PATH. IF PATH IS THROUGH TRANSISTOR OR TRANSISTOR PAIRS, A DOWN SCALE READING ON METER WILL USUALLY BE OBSERVED AT THE STAGE IN QUESTION.
CURRENT PATH ISOLATED TO TRANSISTOR(S)
CHECK POSITION 1
GOOD
BAD
CHECK EXCITER BD. & FIRST STAGE INPUT CIRCUITRY INCLUDING METERING NETWORK
CHECK POS. 2
BAD
CHECK VOLTAGE BETWEEN EMITTER AND COLLECTOR OF Q501 WITH "POWER SET" CONTROL FULLY CLOCKWISE (SHOULD BE GREATER THAN 10 V
BAD
CHECK INPUT VOLTAGE AT PINS 1 & 2 OF POWER CONTROL BOARD AND "CONTROL OUTPUT" LINE CONNECTION
BAD
BAD
CHECK P-T-T SWITCHES & CONNECTIONS ON MAIN CONTROL BOARD
POWER CONTROL CIRCUITRY DEFECTIVE
GOOD
GOOD
FIRST STAGE OR INPUT OF SECOND STAGE DEFECTIVE
CHECK POS. 3
BAD
PREDRIVER STAGE OR DRIVER STAGE INPUT DEFECTIVE
CHECK POS. 4
LOW
DRIVER OR INPUT TO FINAL AMP. STAGE DEFECTIVE
NEGATIVE
PA TRANSISTORS DEFECTIVE
GOOD
CHECK POS. 5 (FINAL AMP CURRENT)
BAD
FINAL AMP STAGE(S) DEFECTIVE OR OUTPUT OF BOARD MISMATCHED. CHECK POWER CONTROL BOARD, ANTENNA SWITCH AND CABLES
GOOD
PA OK. CHECK POWER CONTROL BOARD, ANTENNA SWITCH AND INTERCONNECTING CABLES

TYPICAL STAGE CHECKOUT

1. MEASURE COLLECTOR VOLTAGE OF EACH STAGE.
2. MAKE VISUAL CHECKS AND RESISTANCE MEASUREMENTS OF COMPONENTS IN STAGE WHERE ABNORMAL INDICATIONS ARE OBSERVED.

TO ISOLATE DEFECTIVE TRANSISTOR(S)

(1) DISCONNECT ONE END OF BIAS RESISTOR OR CHOKE CONNECTED TO BASE OF TRANSISTOR(S) IN QUESTION. FOR EXAMPLE: L504, L506, L508.

(2) DISCONNECT ONE END OR REMOVE COLLECTOR CHOKE OF TRANSISTOR(S) IN QUESTION. FOR EXAMPLE: L505, L507, L509.

(3) FOR PUSH-PULL PAIRS DISCONNECT BASE LEAD (TAB) OF ONE TRANSISTOR. ONLY ONE LEAD NEED BE DISCONNECTED. MAKE SURE LEAD IS COMPLETELY DISCONNECTED FROM PLATING.

(4) USING AN OHMMETER, MEASURE THE RESISTANCES OF THE TRANSISTOR. SEE PA REPAIR NOTES PARAGRAPH FOR MEASUREMENT PROCEDURE.

(5) THE OTHER TRANSISTOR CAN NOW ALSO BE MEASURED (WITHOUT REMOVING BASE LEAD).

(6) REPLACE ANY TRANSISTORS WHICH DO NOT MEASURE CORRECTLY. SEE REMOVAL PROCEDURE.

(7) MEASURE BIAS RESISTOR AND BIAS CHOKE. REPLACE IF DEFECTIVE.

(8) REPLACE ANY OTHER COMPONENTS. TRANSFORMERS, ETC. WHICH APPEAR OVERHEATED.

(9) RECONNECT ALL OTHER COMPONENTS.

(10) IF RF POWER IS REGAINED, CHECK CIRCUITRY FOR ANY RAPIDLY OVERHEATING COMPONENTS SUCH AS TRANSFORMERS. IF SO, REPLACE.

DEPS-8387-O

STEP		ND PROCEDURE
1		er.
2		power amplifier tune-up, p 3. To check alignment,
3		NMENT - Set C501 fully
4		adually rotate the POWER SET n initial meter 5 reading is ob- readjust POWER SET control. on is less than 50 uA, pro- 5. If greater than 50 uA, an on-scale reading.
5		hout exceeding rated power atts on wattmeter or calibra- e on meter 1, adjust the POWER r rated power or until no fur- n power output is observed. is greater than 25 uA, adjust ounterclockwise (if less than POWER SET clockwise) until is between 15 and 25 uA.
6		UTPUT - Tune C501 for er 5 reading.
7		just the POWER SET control r output and repeat step 6 cannot be attained, repeat eading, it must not exceed 50 uA.
8		CTOR CURRENT - The rela- en the meter reading and the being measured is 50 uA = re, to measure the final col- (I_C) in amperes, take 1/5 ding.
9		CTOR VOLTAGE - The etween the meter reading voltage being measured is Therefore, to measure the voltage (V_C) in volts, read ctly.
10		POWER - (Pin) - Pin = ld be less than 120 watts.

EXCERPTS FROM FCC REGULATIONS

FCC Regulations state that:

1. Radio transmitters may be tuned or adjusted only by persons holding a first or second class commercial radiotelephone operator's license or by personnel working directly under their immediate supervision.

2. The power input to the final radio frequency stage shall not exceed the maximum figure specified on the current station authorization. This power input shall be measured and the results recorded:

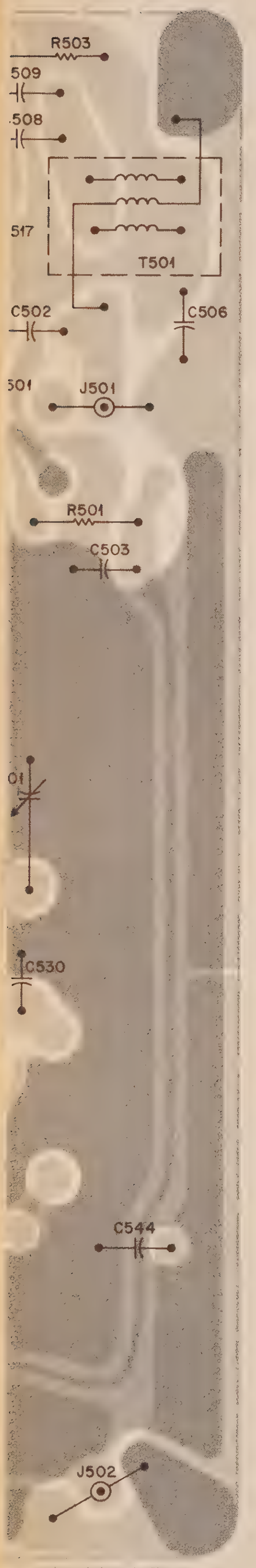
   a. When the transmitter is initially installed.
   b. When any change is made in the transmitter which may increase the power input.
   c. At intervals not to exceed one year.

3. Frequency and deviation of a transmitter must be checked:

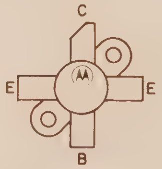
   a. When it is initially installed.
   b. When any change is made in the transmitter which may affect the carrier frequency or modulation characteristics.
   c. At intervals not to exceed one year.

ALIGNMENT PROCEDURE

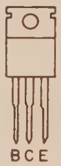
	PORTABLE TEST SET			OPTIONAL BUILT-IN METER SWITCHES POSITION						
STEP	METERING PLUG LOCATION	TEST SET SWITCH POSITION	ADAPTER CABLE SWITCH POSITION	METER CHASSIS SELECTOR SWITCH		TRANSMITTER SELECTOR SWITCH (INTERMITTENT DUTY ONLY)	EXCITER SELECTOR SWITCH (CONTINUOUS DUTY ONLY)	POWER AMPLIFIER SELECTOR SWITCH (CONTINUOUS DUTY ONLY)	ADJUST	STAGE AND PROCEDURE
				INTERMITTENT DUTY MODELS	CONTINUOUS DUTY MODELS					
1	--	--	--	--	--	--	--	--	--	Align the exciter.
2	--	--	--	--	--	--	--	--	--	For complete power amplifier tune-up, proceed to step 3. To check alignment, go to step 7.
3	--	--	--	--	--	--	--	--	C501	PA PRE-ALIGNMENT - Set C501 fully clockwise.
4	POWER CONTROL BOARD	5	METER REV. REF B	XMIT	PA	PWR CONT 5	5	4	POWER SET C501	OUTPUT - Gradually rotate the POWER SET control until an initial meter 5 reading is observed. Do not readjust POWER SET control. If this indication is less than 50 uA, proceed with step 5. If greater than 50 uA, tune C501 for an on-scale reading.
5	POWER CONTROL BOARD	Watt-meter or 1&5	METER REV. REFA	XMIT	PA	PWR CONT 1	5	2	POWER SET	OUTPUT - Without exceeding rated power output of 60 watts on wattmeter or calibration label value on meter 1, adjust the POWER SET control for rated power or until no further increase in power output is observed. If PA Meter 5 is greater than 25 uA, adjust POWER SET counterclockwise (if less than 15 uA, adjust POWER SET clockwise) until meter reading is between 15 and 25 uA.
6	POWER CONTROL BOARD	5	METER REV. REF B	XMIT	PA	PWR CONT 5	5	4	C501	PA DRIVER OUTPUT - Tune C501 for minimum meter 5 reading.
7	POWER CONTROL BOARD	Watt-meter or 1 5	METER REV. REF A METER REV. REF B	XMIT XMIT	PA PA	PWR CONT 1 PWR CONT 5	5 5	2 4	POWER SET	OUTPUT - Adjust the POWER SET control for rated power output and repeat step 6 (if rated power cannot be attained, repeat steps 5 and 6). Check meter reading, it must not exceed 50 uA.
8	PA	5	METER REV. REF B	XMIT	PA	PA5	5	5	--	FINAL COLLECTOR CURRENT - The relationship between the meter reading and the actual current being measured is 50 uA = 10A. Therefore, to measure the final collector current (I_C) in amperes, take 1/5 the meter reading.
9	PA	6	METER REV. REF B	XMIT	PA	PA6	5	6	--	FINAL COLLECTOR VOLTAGE - The relationship between the meter reading and the actual voltage being measured is 50 uA = 50 V. Therefore, to measure the final collector voltage (V_C) in volts, read the meter directly.
10	--	--	--	--	--	--	--	--	--	FINAL INPUT POWER - (Pin) - Pin = V_cI_c and should be less than 120 watts.


R503
509
508
517
T501
C502
C506
501
J501
R501
C503
01
C530
C544
J502

TRANSISTOR DETAILS

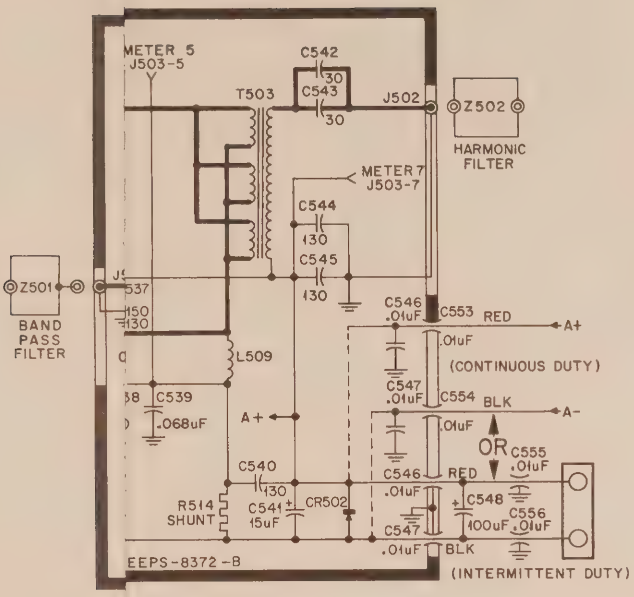


TOP VIEW



FRONT VIEW

[illegible]
BD-DEPS-6431-A
OL-DEPS-8388-A

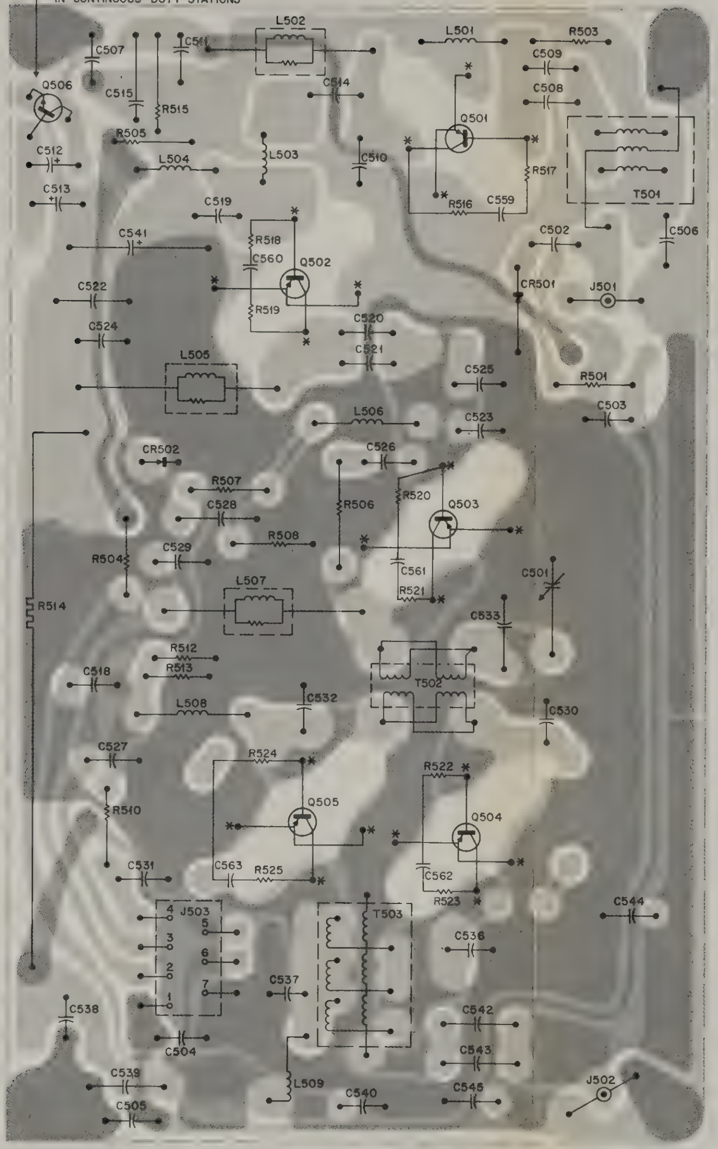

METER 5
J503-5
C542
30
C543
30
T503
J502
Z502
HARMONIC FILTER
METER 7
J503-7
C544
130
C545
130
Z501
BAND PASS FILTER
537
150
130
C546
.01uF
C553
RED
A+
.01uF
(CONTINUOUS DUTY)
L509
C547
.01uF
C554
BLK
A-
C539
.068uF
A+
.01uF
OR
C555
.01uF
C540
130
C546
RED
.01uF
C548
R514
SHUNT
C541
15uF
CR502
C547
100uF
C556
.01uF
.01uF
BLK
EEPS-8372-B
(INTERMITTENT DUTY)

60-WATT POWER AMPLIFEIR

PREVIOUS REVISIONS AND PARTS LIST
SHOWN ON BACK OF THIS DIAGRAM

60-Watt Power Amplifier
Schematic Diagram
Motorola No. 63P81015E13-B
1/12/77-UP

Q506 MOUNTS OFF OF BOARD IN CONTINUOUS DUTY STATIONS


Q506
C507
C515
R515
C511
L502
C514
L501
R503
C509
C508
Q501
T501
R517
R516
C559
C506
R505
C512
L504
L503
C510
C513
C519
R518
C560
Q502
R519
C541
C522
C524
C502
CR501
J501
C520
C521
L505
C525
R501
L506
C503
C523
CR502
C526
R507
R520
Q503
C528
R506
R508
C529
R504
C561
R521
C501
L507
R514
C533
R512
R513
T502
C518
C532
L508
C530
C527
R524
R522
R510
Q505
Q504
C531
C563
R525
C562
R523
C544
J503
T503
C536
C537
C538
C542
C504
C543
C539
L509
C540
C545
J502
C505

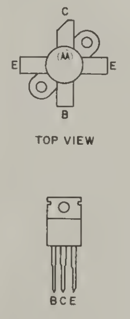
SHOWN FROM COMPONENT SIDE

● SOLDER SIDE

BD-DEPS-6431-A
OL-DEPS-8388-A

* THESE TRANSISTOR LEADS ARE CONNECTED TO ONLY THE COMPONENT SIDE OF THE BOARD.

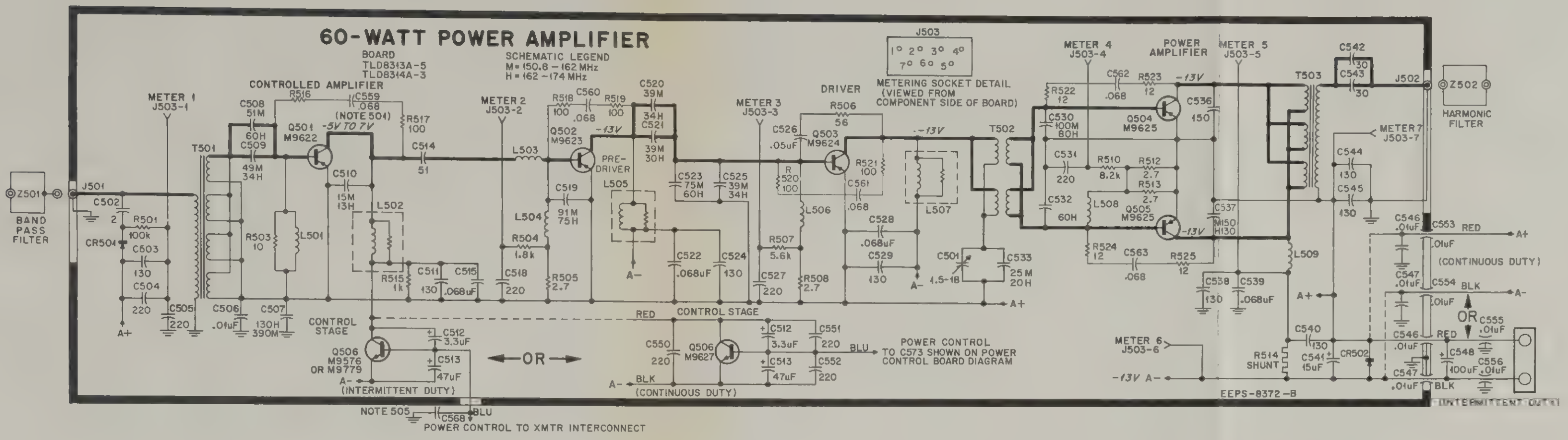
TRANSISTOR DETAILS



TOP VIEW

FRONT VIEW

60-Watt Power Amplifier
Circuit Board Detail
Motorola No. PEPS-8639-A
1/12/77-UP


60-WATT POWER AMPLIFIER
BOARD
TLD8313A-5
TLD8314A-3
SCHEMATIC LEGEND
M= 150.8 – 162 MHz
H= 162 – 174 MHz
CONTROLLED AMPLIFIER
METER 1
J503-1
METER 2
J503-2
METER 3
J503-3
METER 4
J503-4
METER 5
J503-5
METER 6
J503-6
METER 7
J503-7
J503
1° 2° 3° 4°
7° 6° 5°
METERING SOCKET DETAIL
(VIEWED FROM
COMPONENT SIDE OF BOARD)
DRIVER
PRE-DRIVER
POWER AMPLIFIER
Z501
BAND PASS FILTER
Z502
HARMONIC FILTER
J501
J502
T501
T502
T503
CR504
Q501 M9622
Q502 M9623
Q503 M9624
Q504 M9625
Q505 M9625
Q506 M9576 OR M9779
Q506 M9627
(NOTE 504)
-5V TO 7V
-13V
CONTROL STAGE
(INTERMITTENT DUTY)
(CONTINUOUS DUTY)
OR
RED
BLK
BLU
A+
A–
POWER CONTROL
TO C573 SHOWN ON POWER
CONTROL BOARD DIAGRAM
NOTE 505
C568
POWER CONTROL TO XMTR INTERCONNECT
R514 SHUNT
CR502
EEPS-8372-B
(INTERMITTENT DUTY)

POWER AMPLIFIERS

501. VOLTAGES DEPENDENT UPON AMOUNT OF CUTBACK FROM POWER CONTROL BOARD.
502. VOLTAGES MEASURED IN RESPECT TO A+ UNLESS OTHERWISE SPECIFIED.
503. UNLESS OTHERWISE SPECIFIED:
CAPACITOR VALUES ARE IN PICOFARADS.
504. THE CONTROL STAGE TRANSISTOR IS BOARD-MOUNTED FOR INTERMITTENT DUTY OPERATION AND CHASSIS-MOUNTED FOR CONTINUOUS DUTY OPERATION.
505. C568 IS PART OF TRANSMITTER CHASSIS & HARDWARE KIT.

EPS-8362-O

PREVIOUS REVISIONS AND PARTS LIST
SHOWN ON BACK OF THIS DIAGRAM

60-Watt Power Amplifier
Schematic Diagram
Motorola No. 63P81015E13-B
1/12/77-UP

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CONNECTOR, receptacle:
501	28C84227B01	male; coaxial; miniature type
502	28C84227B01	male; coaxial; miniature type
503	9C84207B01	female; 7-contact
		COIL, RF:
501	24C83961B01	choke; consists of a ferrite core with a 3-turn winding
502H	24C84392B03	choke; consists of a resistor (82 Ohms ±10%; 1 Watt) covered with a 6-turn winding
502HH	24C84392B01	choke; consists of a resistor (120 Ohms ±10%; 1 Watt) covered with a 6-turn winding
503	24C83884G03	choke; 1-1/2 turns, molded
504	24C83961B01	choke; consists of a ferrite core with a 3-turn winding
505	24C84392B02	choke; consists of a resistor (39 Ohms ±10%; 2 Watt) covered with a 4-turn winding
506H	24D82723H04	choke; 0.29 uH
506HH	24B83977B01	choke; 1-1/2 turns on ferrite body
507	24C84392B04	choke; consists of a resistor (100 Ohms ±10%; 2 Watt) covered with a 4-turn winding
508	24B83977B01	choke; 1-1/2 turns on ferrite body
509	24B84393B02	choke; 5-1/2 turns
		RESISTOR, fixed: ±10%; 1/4 W; unless otherwise stated
501	6S124C97	100k
503	6S124A01	10 ±5%
504	6S124C55	1.8k
505	6S124B55	2.7 ±5%
506	6S125C19	56; 1/2 W
507	6S124C67	5.6k
508	6S124B55	2.7 ±5%
10	6S124C71	8.2k
512	6S124B55	2.7 ±5%
513	6S124B55	2.7 ±5%
514	6C84232B02	(meter shunt)
515	6S124C49	1k
		TRANSFORMER, RF:
501	25C84396B01	pri: 5 turns sec: 4 windings, 1 turn each
502	25C84818B01	pri: 2 windings, 1-3/4 turns each: sec: 2 windings; 1-3/4 turns each
503	25B84012C01	pri: 3 windings, 1-1/2 turns each: sec: 4 turns

LN4742A PA Hardware Kit (continuous duty)
/o TLD1703A & TLD1704A) PL-1737-A

		TRANSISTOR: (SEE NOTE)
501	48R869622	P-N-P; type M9622
502	48R869623	P-N-P; type M9623
503	48R869624	P-N-P; type M9624
504, 505	48R869625	P-N-P; type M9625

OTE:

Additional electrical components for TLN4742A are listed in the Power Control and Transmitter Interconnect sections; hardware is listed in the Transmitter Hardware Kits section.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

TLN4780A PA Heat Sink Kit (continuous duty)
(p/o TLD1703A & TLD1704A) PL-1738-O

		CAPACITOR, fixed:
C546, 547	21C84211B02	.01 uF +100-0%; 250 V

NOTE:

Hardware for TLN4780A is listed in the Transmitter Hardware Kits section.

TLN5922A Input Bracket and Cable PL-5090-O

		CAPACITOR, fixed:
C560, 561, 562	21-410115	220 pF ±20%; 500 V
C565, 566	21-84211B01	.001 uF; 250 V
		TRANSISTOR: (SEE NOTE)
Q509	48-869627	NPN; type M9627

NOTE: Cable assemblies are listed in the RF Cables section; additional electrical components are listed in the Transmitter Interconnect section; hardware is listed in the Transmitter Hardware Kits section.

TLN4781A Xmtr. Chassis & Heat Sink (intermittent duty)
(p/o TLD1673A & TLD1674A) PL-1740-B

		CAPACITOR, fixed:
C548	23D83210A08	100 uF +150-10%; 25 V
C555 thru 558	21C84211B01	.01 uF +100-0%; 250 V
C568	21-82880E19	500 pF ±10%; 1000 V
		TRANSISTOR: (SEE NOTE)
Q501	48R869622	P-N-P; type M9622
Q502	48R869623	P-N-P; type M9623
Q503	48R869624	P-N-P; type M9624
Q504, 505	48R869625	P-N-P; type M9625
Q506	48R869576 or 48R869779	N-P-N; type M9576 N-P-N; type M9779

NOTE:

Additional electrical components for TLN4781A are listed in the Transmitter Interconnect section; hardware is listed in the Transmitter Hardware Kits section.

TLN5074A Terminal Bracket Kit PL-1831-O

		CAPACITOR, fixed:
C555, 556	21-84211B01	.01 uF +100-0%; 250 V

NOTE:

Hardware for TLN5074A is listed in the Transmitter Hardware Kits section.

Exciter Output Filter PL-1741-O

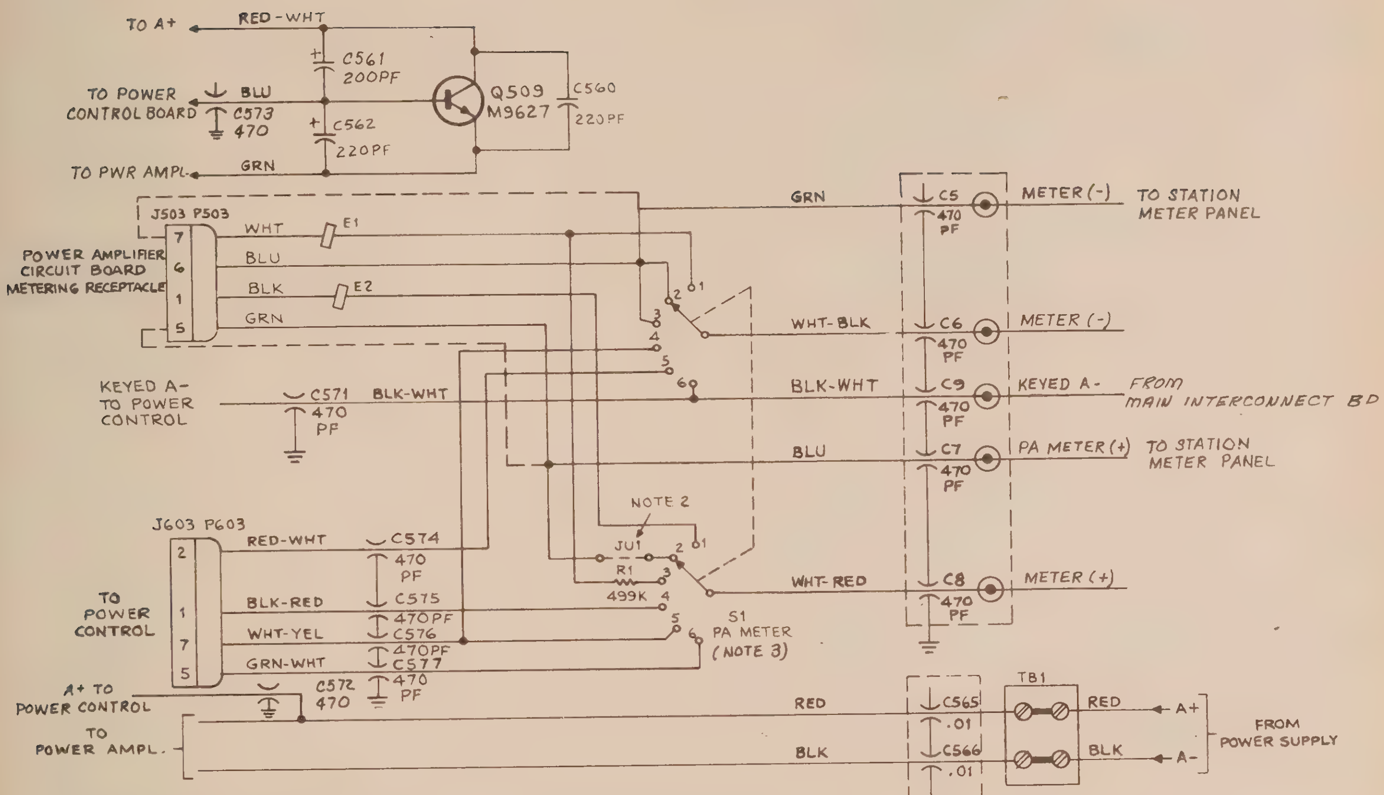
Z501	TFD6112A	FILTER, RF: bandpass; 150.8-174 MHz

PA Output (Harmonic) Filter PL-1742-O

Z502	TFD6102A	FILTER, RF: low-pass 150.8-174 MHz

NOTE:

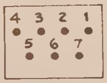
Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.


TO A+
RED-WHT
C561
200PF
Q509
M9627
C560
220PF
TO POWER CONTROL BOARD
BLU
C573
470
C562
220PF
TO PWR AMPL.
GRN
J503 P503
POWER AMPLIFIER CIRCUIT BOARD METERING RECEPTACLE
7
6
1
5
WHT
E1
BLU
BLK
E2
GRN
KEYED A- TO POWER CONTROL
C571
470 PF
BLK-WHT
J603 P603
TO POWER CONTROL
2
1
7
5
RED-WHT
BLK-RED
WHT-YEL
GRN-WHT
C574
470 PF
C575
470PF
C576
470PF
C577
A+ TO POWER CONTROL
C572
470
470 PF
TO POWER AMPL.
NOTE 2
JU1
R1
499K
S1
PA METER
(NOTE 3)
GRN
WHT-BLK
BLK-WHT
BLU
WHT-RED
RED
BLK
C5
470 PF
C6
470 PF
C9
470 PF
C7
470 PF
C8
470 PF
C565
.01
C566
.01
METER (-)
TO STATION METER PANEL
METER (-)
KEYED A-
FROM MAIN INTERCONNECT BD
PA METER (+)
TO STATION METER PANEL
METER (+)
TB1
RED
BLK
A+
A-
FROM POWER SUPPLY

NOTES:

1. FEEDTHRU CAPACITORS C571 THRU C577 ARE MOUNTED ON POWER CONTROL BOARD MOUNTING BRACKET, ALL OTHER COMPONENTS ARE MOUNTED ON PA INPUT BRACKET
2. JU1 IS REMOVED WHEN A SECOND METER IS USED TO MEASURE PA CURRENT.
3. PA METER SWITCH S1 AND ASSOCIATED COMPONENTS (P503, P603, E1, E2, AND R1) ARE PART OF THE V VERSION AMPLIFIER MODELS AND ARE SHOWN HERE FOR REFERENCE ONLY TO PROVIDE INTERCONNECTION DATA. CONNECTIONS SHOWN IN DASHED LINES ARE USED ON UNIFIED CHASSIS MODELS.

S1 SWITCH POSITION	FUNCTION METERED
1	PA INPUT
2	FINAL PA CURRENT
3	FINAL PA VOLTAGE
4	FORWARD POWER
5	REFLECTED POWER
6	CONTROL VOLTAGE



P503 DETAIL
(SHOWN FROM PIN SIDE)

CEPS-22932-A

PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

TLN5922A Input Bracket and Cable Assembly
Schematic Diagram
Motorola No. 63P81033E29-A
8/9/77-UP

REVISIONS

PEPS-8640-A

CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION	REFER TO CIRCUIT BOARD
TLN4781A	Q506	ADDED ALTERNATE TRANSISTOR 48R869779, TYPE M9779	PARTS LIST	NOT AFFECTED

PARTS LIST

TRN6444A R-C Regen Suppressor Kit
(P/O TLD1670 Series & TLD1700 Series) PL-3530-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR
C559-563	8D83813H05	.068 uF ±10%; 100 V
		RESISTOR; fixed: ±10%; 1/2 W
R516-519	6S125C25	100
R520, 521	6S125C11	27
R522-525	6S125C03	12

PARTS LIST

IMPORTANT

USE ONLY THE FOLLOWING MOTOROLA PART NUMBERS WHEN ORDERING REPLACEMENT PARTS

LEGEND:
H - (150.8-162 MHz)
HH (162-174 MHz)

TLD8313A PA Board (150.8-162 MHz)
TLD8314A PA Board (162-174 MHz)

PL-1736-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed; pF; ±5% 500 V; unless otherwise stated
C501	20C83201B07	variable: 1.5-18; 100 V
C502	21D83406D52	2 ±0.25 pF; NP0
C503	21D84494B26	130
C504	21D83596E10	220 ±20%
C505	21D83596E10	220 ±20%
C506	21D82428B59	.01 uF +80-20%; 200 V
C507HH	21D84494B26	130 pF
C507H	21D84494B18	390 pF
C508H	21D84494B01	51
C508HH	21D84494B35	60
C509H	21D84494B25	49
C509HH	21D84494B30	34
C510H	21D84494B38	15
C510HH	21D84494B36	13
C511H	21D84494B26	130
C511HH		NOT USED
C512	23D83214C17	3.3 uF ±20%; 25 V
C513	23D83214C10	47 uF ±20%; 25 V
C514	21D84494B01	51 pF
C515	8D83813H05	.068 uF ±10%; 100 V
C518	21D83596E10	220 ±20%
C519H	21D84494B52	91 pF
C519HH	21D84494B31	75
C520H	21D84494B24	39
C520HH	21D84494B30	34
C521H	21D84494B24	39
C521HH	21D84494B33	30
C522	8D83813H05	.068 uF ±10%; 100 V
C523H	21D84494B31	75
C523HH	21D84494B35	60
C524	21D84494B26	130
C525H	21D84494B24	39
C525HH	21D84494B30	34
C526	21C82372C04	.05 uF +80-20%; 25 V
C527	21D83596E10	220 ±20%
C528	8D83813H05	.068 uF ±10%; 100 V
C529	21D84494B26	130
C530	21D84395B03	80 pF; 250 V
C531	21D83596E10	220 ±20%
C532H	21D84395B03	80 pF; 250 V
C532HH	21D84395B07	60; 250 V
C533H	21D84936A04	25 pF, 2000 V, P120
C533HH	21D84936A07	15; 2000 V; P120
C536	21D84395B06	150; 250 V
C537H	21D84395B06	150; 250 V
C537HH	21D84395B05	130; 250 V
C538	21D84494B26	130
C539	8D83813H05	.068 uF ±10%; 100 V
C540	21D84494B26	130
C541	23D83210A21	15 uF +150-10%; 25 V
C542	21D84936A06	30 ±1.5 pF; 2000 V; P120
C543	21D84936A06	30 ±1.5 pF; 2000 V; P120
C544	21D84494B26	130
C545	21D84494B26	130
		SEMICONDUCTOR DEVICE, diode; (SEE NOTE)
CR501	48C82139G01	germainium
CR502	48C82525G01	silicon

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CONNECTOR, receptacle:
J501	28C84227B01	male; coaxial; miniature type
J502	28C84227B01	male; coaxial; miniature type
J503	9C84207B01	female; 7-contact
		COIL, RF:
L501	24C83961B01	choke; consists of a ferrite core with a 3-turn winding
L502H	24C84392B03	choke; consists of a resistor (82 Ohms ±10%; 1 Watt) covered with a 6-turn winding
L502HH	24C84392B01	choke; consists of a resistor (120 Ohms ±10%; 1 Watt) covered with a 6-turn winding
L503	24C83884G03	choke; 1-1/2 turns, molded
L504	24C83961B01	choke; consists of a ferrite core with a 3-turn winding
L505	24C84392B02	choke; consists of a resistor (39 Ohms ±10%; 2 Watt) covered with a 4-turn winding
L506H	24D82723H04	choke; 0.29 uH
L506HH	24B83977B01	choke; 1-1/2 turns on ferrite body
L507	24C84392B04	choke; consists of a resistor (100 Ohms ±10%; 2 Watt) covered with a 4-turn winding
L508	24B83977B01	choke; 1-1/2 turns on ferrite body
L509	24B84393B02	choke; 5-1/2 turns
		RESISTOR, fixed: ±10%; 1/4 W; unless otherwise stated
R501	6S124C97	100k
R503	6S124A01	10 ±5%
R504	6S124C55	1.8k
R505	6S124B55	2.7 ±5%
R506	6S125C19	56; 1/2 W
R507	6S124C67	5.6k
R508	6S124B55	2.7 ±5%
R510	6S124C71	8.2k
R512	6S124B55	2.7 ±5%
R513	6S124B55	2.7 ±5%
R514	6C84232B02	(meter shunt)
R515	6S124C49	1k
		TRANSFORMER, RF:
T501	25C84396B01	pri: 5 turns sec: 4 windings, 1 turn each
T502	25C84818B01	pri: 2 windings, 1-3/4 turns each: sec: 2 windings; 1-3/4 turns each
T503	25B84012C01	pri: 3 windings, 1-1/2 turns each: sec: 4 turns

TLN4742A PA Hardware Kit (continuous duty)
(p/o TLD1703A & TLD1704A) PL-1737-A

		TRANSISTOR: (SEE NOTE)
Q501	48R869622	P-N-P; type M9622
Q502	48R869623	P-N-P; type M9623
Q503	48R869624	P-N-P; type M9624
Q504, 505	48R869625	P-N-P; type M9625

NOTE:

Additional electrical components for TLN4742A are listed in the Power Control and Transmitter Interconnect sections; hardware is listed in the Transmitter Hardware Kits section.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

TLN4780A PA Heat Sink Kit (continuous duty)
(p/o TLD1703A & TLD1704A) PL-1738-O

		CAPACITOR, fixed:
C546, 547	21C84211B02	.01 uF +100-0%; 250 V

NOTE:

Hardware for TLN4780A is listed in the Transmitter Hardware Kits section.

TLN5922A Input Bracket and Cable PL-5090-O

		CAPACITOR, fixed:
C560, 561, 562	21-410115	220 pF ±20%; 500 V
C565, 566	21-84211B01	.001 uF; 250 V
		TRANSISTOR: (SEE NOTE)
Q509	48-869627	NPN; type M9627

NOTE: Cable assemblies are listed in the RF Cables section; additional electrical components are listed in the Transmitter Interconnect section; hardware is listed in the Transmitter Hardware Kits section.

TLN4781A Xmtr. Chassis & Heat Sink (intermittent duty)
(p/o TLD1673A & TLD1674A) PL-1740-P

		CAPACITOR, fixed:
C548	23D83210A08	100 uF +150-10%; 25 V
C555 thru 558	21C84211B01	.01 uF +100-0%; 250 V
C568	21-82880E19	500 pF ±10%; 1000 V
		TRANSISTOR: (SEE NOTE)
Q501	48R869622	P-N-P; type M9622
Q502	48R869623	P-N-P; type M9623
Q503	48R869624	P-N-P; type M9624
Q504, 505	48R869625	P-N-P; type M9625
Q506	48R869576 or 48R869779	N-P-N; type M9576 N-P-N; type M9779

NOTE:

Additional electrical components for TLN4781A are listed in the Transmitter Interconnect section; hardware is listed in the Transmitter Hardware Kits section.

TLN5074A Terminal Bracket Kit PL-1831-O

		CAPACITOR, fixed:
C555, 556	21-84211B01	.01 uF +100-0%; 250 V

NOTE:

Hardware for TLN5074A is listed in the Transmitter Hardware Kits section.

Exciter Output Filter [illegible]

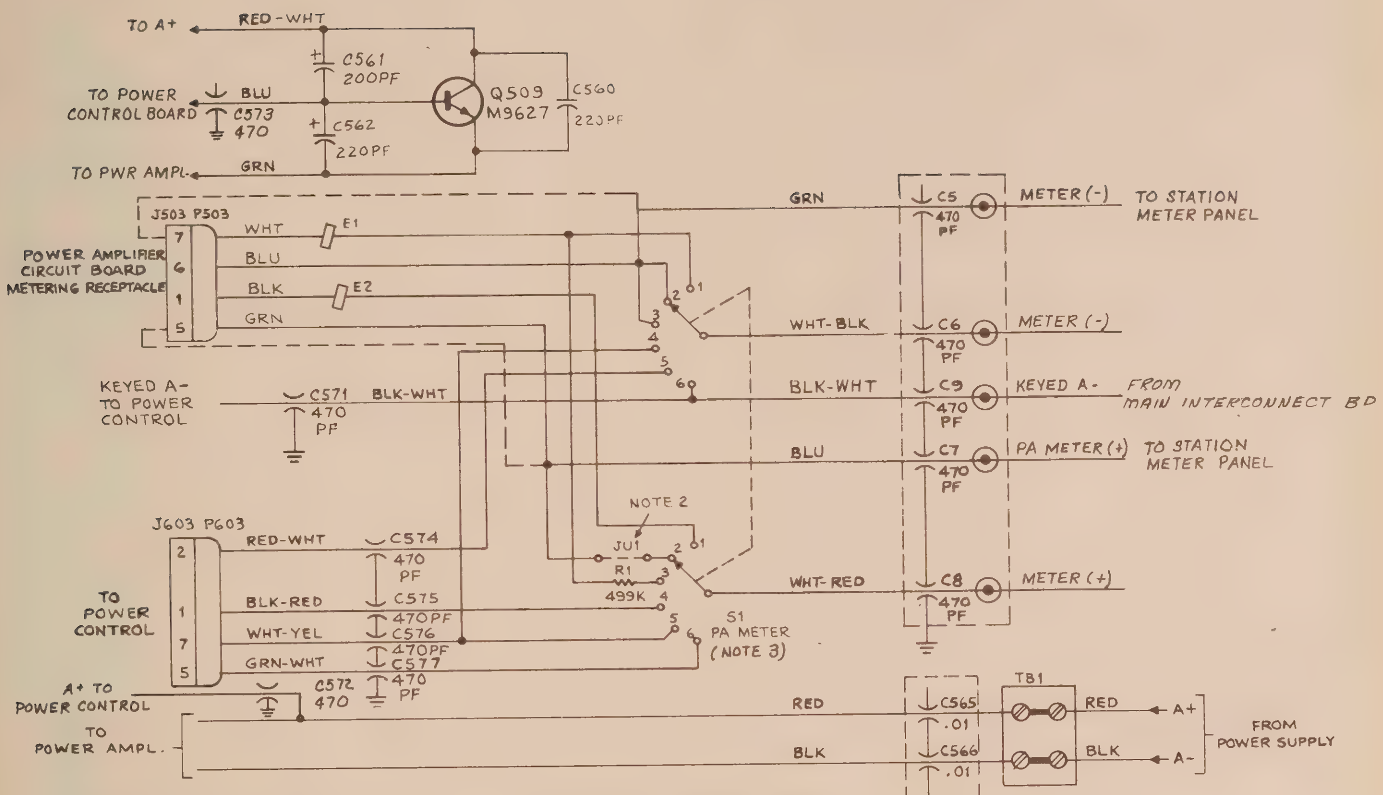
Z501	TFD6112A	FILTER, RF: bandpass; 150.8-174 MHz

PA Output (Harmonic) Filter PL-1742-C

Z502	TFD6102A	FILTER, RF: low-pass 150.8-174 MHz

NOTE:

Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.


TO A+
RED-WHT
C561
200PF
TO POWER
CONTROL BOARD
BLU
C573
470
C562
220PF
Q509
M9627
C560
220PF
TO PWR AMPL
GRN
J503 P503
POWER AMPLIFIER
CIRCUIT BOARD
METERING RECEPTACLE
7
6
1
5
WHT
E1
BLU
BLK
E2
GRN
C5
470
PF
METER (-)
TO STATION
METER PANEL
WHT-BLK
C6
470
PF
METER (-)
KEYED A-
TO POWER
CONTROL
C571
470
PF
BLK-WHT
C9
470
PF
KEYED A-
FROM
MAIN INTERCONNECT BD
BLU
C7
470
PF
PA METER (+)
TO STATION
METER PANEL
NOTE 2
J603 P603
2
RED-WHT
C574
470
PF
JU1
R1
499K
WHT-RED
C8
470
PF
METER (+)
TO
POWER
CONTROL
1
BLK-RED
C575
470PF
7
WHT-YEL
C576
470PF
5
GRN-WHT
C577
S1
PA METER
(NOTE 3)
A+ TO
POWER CONTROL
C572
470
470
PF
TO
POWER AMPL.
RED
C565
.01
TB1
RED
A+
BLK
C566
.01
BLK
A-
FROM
POWER SUPPLY

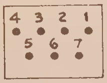
NOTES:

1. FEEDTHRU CAPACITORS C571 THRU C577 ARE MOUNTED ON POWER CONTROL BOARD MOUNTING BRACKET, ALL OTHER COMPONENTS ARE MOUNTED ON PA INPUT BRACKET

2. JU1 IS REMOVED WHEN A SECOND METER IS USED TO MEASURE PA CURRENT.

3. PA METER SWITCH S1 AND ASSOCIATED COMPONENTS (P503, P603, E1, E2, AND R1) ARE PART OF THE V VERSION AMPLIFIER MODELS AND ARE SHOWN HERE FOR REFERENCE ONLY TO PROVIDE INTERCONNECTION DATA. CONNECTIONS SHOWN IN DASHED LINES ARE USED ON UNIFIED CHASSIS MODELS.

S1 SWITCH POSITION	FUNCTION METERED
1	PA INPUT
2	FINAL PA CURRENT
3	FINAL PA VOLTAGE
4	FORWARD POWER
5	REFLECTED POWER
6	CONTROL VOLTAGE



P503 DETAIL
(SHOWN FROM PIN SIDE)

CEPS-22932-A

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

TLN5922A Input Bracket and
Cable Assembly
Schematic Diagram
Motorola No. 63P81033E29-A
8/9/77-UP

PARTS LIST

TLN5922A Input Bracket & Cable Kit PL-5180-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C5 thru 9	21-821474	470 pF ±20%; 500 V
C560, 561, 562	21-410115	220 pF ±20%; 500 V
C565, 566	21-84211B01	.01 uF; 250 V
		TRANSISTOR: (SEE NOTE I)
Q509	48-869627	NPN; type M9627
		TERMINAL BOARD:
TB1	31-50378	2-terminal
	NON-REFERENCED ITEMS	
	1-80793B63	BRACKET ASSEMBLY includes:
	7-82961L01	BRACKET, input
	9-84935D01	SOCEKT, transistor (for Q509)
		CAPACITORS C5 thru C9
	2-115968	NUT, hex: 1/4-28 x 3/8 x 1/8"; 2 used
	3-3360	SCREW, tapping: 6-20 x 1/2"; 2 used
	3-8153	SCREW, tapping: 8-15 x 3/4"; 2 used
	4-7557	WASHER, flat: .172 x .375 x .033; 2 used
	4-7678	WASHER, lock: #1/4 (external tooth); 2 used
	14-865875	INSULATOR, transistor
	29-5223	LUG, soldering: #8L; 2 used

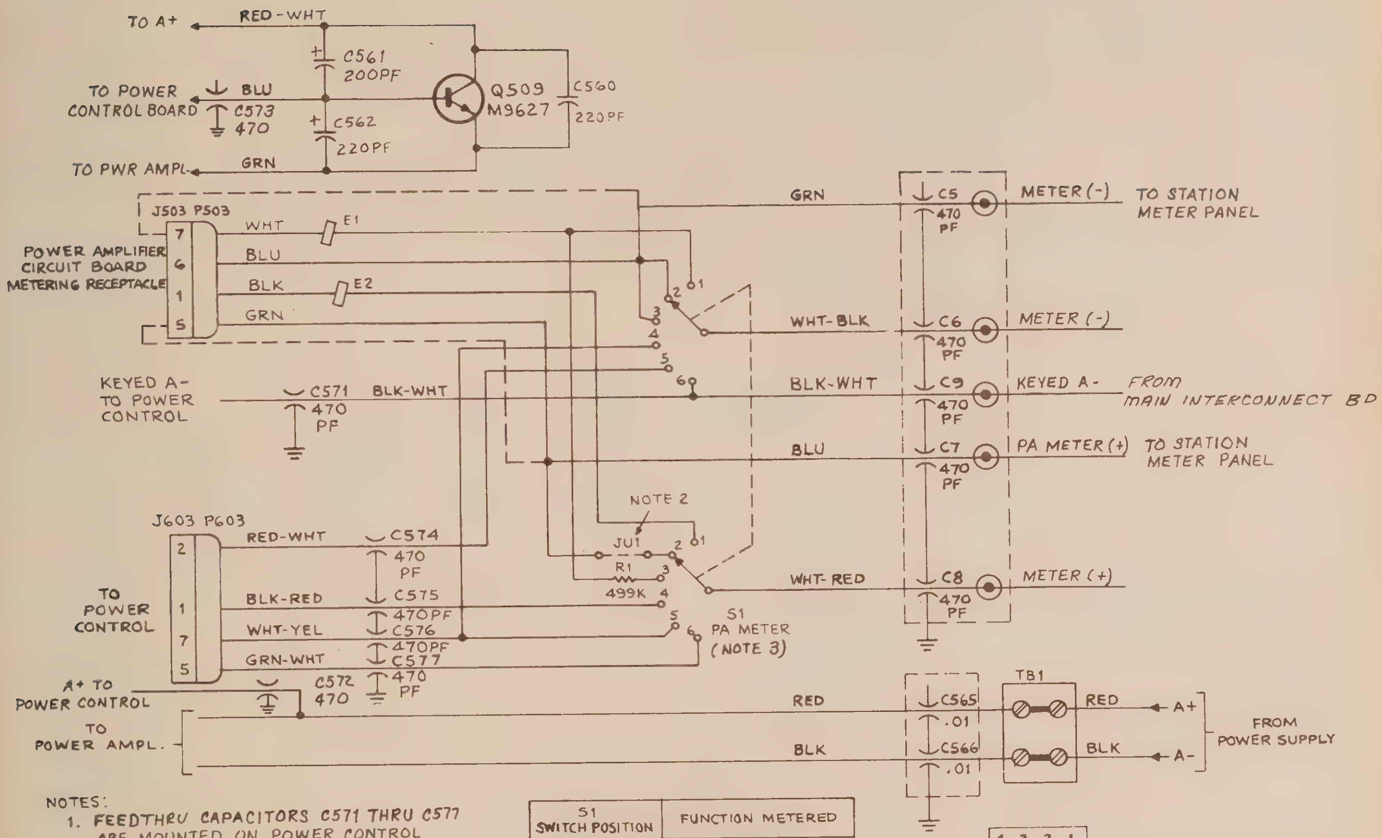
NOTE:

I For optimum performance, replacement diodes and transistors must be ordered by Motorola part numbers.

II Cable assemblies for TLN5922A are listed in the RF Intercabling Section.

TLN4741A Hardware Kit, 100 W
TLN4742A Hardware Kit, 60 W PL-5179-O

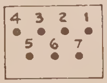
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C571 thru 577	21-821474	470 pF ±20%; 500 V


TO A+
RED-WHT
C561
200PF
TO POWER
CONTROL BOARD
BLU
C573
470
C562
220PF
Q509
M9627
C560
220PF
TO PWR AMPL
GRN
J503 P503
POWER AMPLIFIER
CIRCUIT BOARD
METERING RECEPTACLE
7
6
1
5
WHT
E1
BLU
BLK
E2
GRN
GRN
C5
470 PF
METER (-)
TO STATION
METER PANEL
WHT-BLK
C6
470 PF
METER (-)
KEYED A-
TO POWER
CONTROL
C571
470 PF
BLK-WHT
BLK-WHT
C9
470 PF
KEYED A-
FROM
MAIN INTERCONNECT BD
BLU
C7
470 PF
PA METER (+)
TO STATION
METER PANEL
NOTE 2
J603 P603
2
1
7
5
TO
POWER
CONTROL
RED-WHT
C574
470 PF
JU1
R1
499K
BLK-RED
C575
470PF
WHT-YEL
C576
470PF
GRN-WHT
C577
470 PF
WHT-RED
C8
470 PF
METER (+)
S1
PA METER
(NOTE 3)
A+ TO
POWER CONTROL
C572
470
TO
POWER AMPL.
RED
BLK
C565
.01
C566
.01
TB1
RED
BLK
A+
A-
FROM
POWER SUPPLY

NOTES:

1. FEEDTHRU CAPACITORS C571 THRU C577 ARE MOUNTED ON POWER CONTROL BOARD MOUNTING BRACKET, ALL OTHER COMPONENTS ARE MOUNTED ON PA INPUT BRACKET
2. JU1 IS REMOVED WHEN A SECOND METER IS USED TO MEASURE PA CURRENT.
3. PA METER SWITCH S1 AND ASSOCIATED COMPONENTS (P503, P603, E1, E2, AND R1) ARE PART OF THE V VERSION AMPLIFIER MODELS AND ARE SHOWN HERE FOR REFERENCE ONLY TO PROVIDE INTERCONNECTION DATA. CONNECTIONS SHOWN IN DASHED LINES ARE USED ON UNIFIED CHASSIS MODELS.

S1 SWITCH POSITION	FUNCTION METERED
1	PA INPUT
2	FINAL PA CURRENT
3	FINAL PA VOLTAGE
4	FORWARD POWER
5	REFLECTED POWER
6	CONTROL VOLTAGE



P503 DETAIL
(SHOWN FROM PIN SIDE)

CEPS-22932-A

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

TLN5922A Input Bracket and
Cable Assembly
Schematic Diagram
Motorola No. 63P81033E29-A
8/9/77-UP

PARTS LIST

TLN5922A Input Bracket & Cable Kit PL-5180-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C5 thru 9	21-821474	470 pF ±20%; 500 V
C560, 561, 562	21-410115	220 pF ±20%; 500 V
C565, 566	21-84211B01	.01 uF; 250 V
		TRANSISTOR: (SEE NOTE I)
Q509	48-869627	NPN; type M9627
		TERMINAL BOARD:
TB1	31-50378	2-terminal
NON-REFERENCED ITEMS		
	1-80793B63	BRACKET ASSEMBLY includes:
	7-82961L01	BRACKET, input
	9-84935D01	SOCEKT, transistor (for Q509)
		CAPACITORS C5 thru C9
	2-115968	NUT, hex: 1/4-28 x 3/8 x 1/8"; 2 used
	3-3360	SCREW, tapping: 6-20 x 1/2"; 2 used
	3-8153	SCREW, tapping: 8-15 x 3/4"; 2 used
	4-7557	WASHER, flat: .172 x .375 x .033; 2 used
	4-7678	WASHER, lock: #1/4 (external tooth); 2 used
	14-865875	INSULATOR, transistor
	29-5223	LUG, soldering: #8L; 2 used

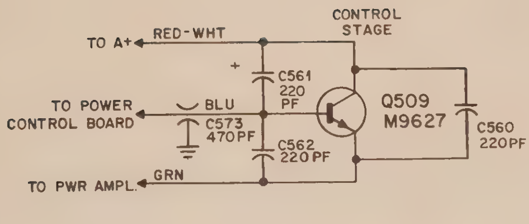
NOTE:

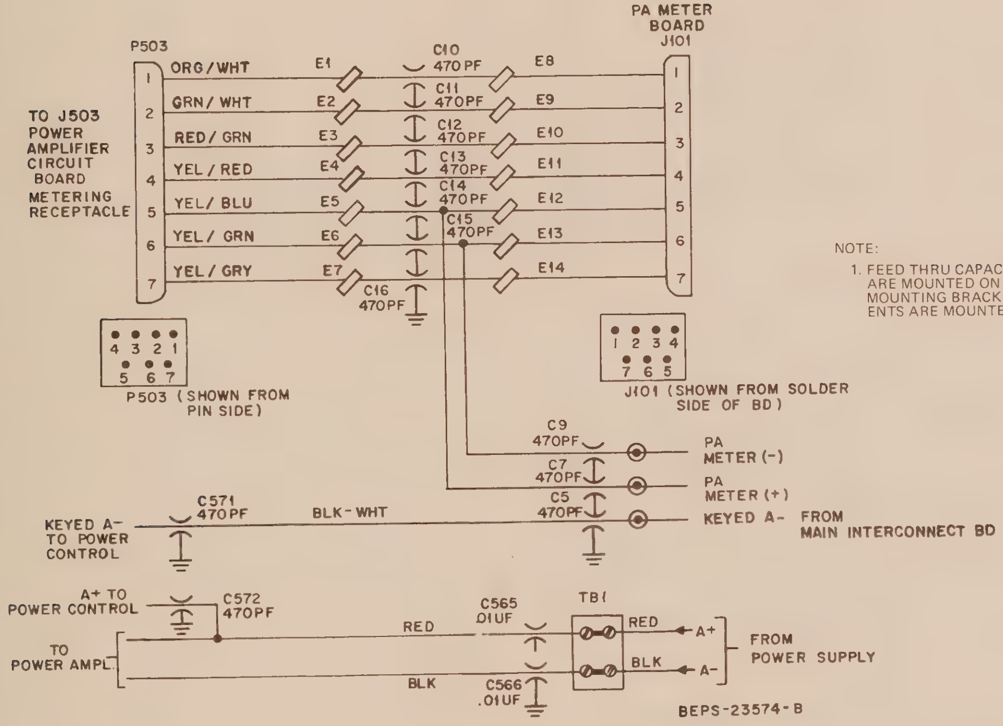
I For optimum performance, replacement diodes and transistors must be ordered by Motorola part numbers.

II Cable assemblies for TLN5922A are listed in the RF Intercabling Section.

TLN4741A Hardware Kit, 100 W
TLN4742A Hardware Kit, 60 W PL-5179-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C571 thru 577	21-821474	470 pF ±20%; 500 V


CONTROL STAGE
TO A+
RED-WHT
+
C561
220
PF
Q509
M9627
C560
220PF
TO POWER CONTROL BOARD
BLU
C573
470PF
C562
220PF
TO PWR AMPL.
GRN


P503
PA METER BOARD
J101
TO J503 POWER AMPLIFIER CIRCUIT BOARD METERING RECEPTACLE
1
2
3
4
5
6
7
ORG/WHT
GRN/WHT
RED/GRN
YEL/RED
YEL/BLU
YEL/GRN
YEL/GRY
E1
E2
E3
E4
E5
E6
E7
C10
470 PF
C11
470PF
C12
470PF
C13
470PF
C14
470PF
C15
470PF
C16
470PF
E8
E9
E10
E11
E12
E13
E14
4 3 2 1
5 6 7
P503 (SHOWN FROM PIN SIDE)
1 2 3 4
7 6 5
J101 (SHOWN FROM SOLDER SIDE OF BD)
C9
470PF
PA METER (-)
C7
470PF
PA METER (+)
C5
470PF
KEYED A-
FROM MAIN INTERCONNECT BD
KEYED A- TO POWER CONTROL
C571
470PF
BLK-WHT
A+ TO POWER CONTROL
C572
470PF
TO POWER AMPL.
RED
BLK
C565
.01UF
C566
.01UF
TB1
RED
BLK
A+
A-
FROM POWER SUPPLY
BEPS-23574-B

NOTE:

1. FEED THRU CAPACITORS C571 THRU C573 ARE MOUNTED ON POWER CONTROL BOARD MOUNTING BRACKET, ALL OTHER COMPONENTS ARE MOUNTED ON PA INPUT BRACKET.

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

TRN8012A Input Bracket
and Cable Assembly
Schematic Diagram
Motorola No. 63P81034E78-B
8/9/77-UP

PARTS LIST

TRN8012A Input Bracket & Cable Assembly (High Band)

PL-5338-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C5, 7, 9 thru 16	21-821474	470 pF ±20%; 500 V
C560, 561, 562	21-410115	220 pF ±20%; 500 V
C565, 566	21-84211B01	.01 uF; 250 V
		FERRITE BEAD:
E1 thru 14	76-83960B01	.138 OD x .118'' lg.
		CONNECTOR, receptacle:
J101	9-84207B01	7-pin
		CONNECTOR, plug:
P503	28-84208B01	7-pin
		TRANSISTOR: (SEE NOTE I)
Q509	48-869627	NPN; type M9627
		TERMINAL BOARD:
TB1	31-50378	2-terminal
	NON-REFERENCED ITEMS	
	1-80798B16	BRACKET ASSEMBLY includes:
	7-84234L01	BRACKET, mounting
	9-84935D01	SOCKET, transistor
	43-82253C07	BUSHING, threaded: 2 used
		CAPACITORS C5, C6, C9-C16, C571 & C573
	1-80792B71	CIRCUIT BOARD ASSEMBLY includes:
	1-80792B83	CIRCUIT BOARD SUBASSEMBLY includes:
	39-10184A10	CONTACT, male: 7 used
		CONNECTOR J101
	2-115968	NUT, hex: 1/4-28 x 3/8 x 1/8''; 2 used
	3-3360	SCREW, tapping: 6-20 x 1/2''; 2 used
	3-8153	SCREW, tapping: 8-15 x 3/4''; 2 used
	3-134184	SCREW, tapping: 4-40 x 5/16''; 2 used
	4-7557	WASHER, flat: .172 x .375 x .033''; 2 used
	4-7678	WASHER, lock: #1/4 (external tooth); 2 used
	14-865875	INSULATOR, transistor
	29-5223	LUG, soldering: #8L; 2 used
	42-84834G01	COVER, plug

NOTES:

I For optimum performance, replacement transistors must be ordered by Motorola part numbers.

II RF Cable assemblies for TRN8012A are listed in the RF Intercabling Section.

TLN4741A Hardware Kit (100 W)
TLN4742A Hardware Kit (60 W)

PL-5344-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C571, 572, 573	21-821474	470 pF ±20%; 500 V

NOTE:

Additional electrical components for TLN4741A & TLN4742A are listed in the 60- & 100-Watt Power Amplifier Board sections; hardware is listed in the Transmitter hardware kits section.

60 W POWER AMPLIFIER

TLD5740A SERIES

MODEL TABLE

MODEL	FREQUENCY RANGE
TLD5743A	150.8-162 MHz
TLD5744A	162-174 MHz

TECHNICAL CHARACTERISTICS*

RF Power In	400 mW
Input Impedance	50 ohms
RF Power Out	60 watts (50 watts optional)
Output Impedance	50 ohms
Power Requirements	13.0 volts @11 amps

*All values are typical

1. DESCRIPTION

Motorola's "Micor" power amplifier boards provide the following features:

- A minimum of 60 W rf output (50 W optional).

- All circuitry contained on one double-sided circuit board.

- Power transistors (and control stage transistor in continuous duty stations) mounted directly to (but electrically isolated from) the heat sink.

- RF connections made through two coaxial connections which plug directly into the input and output.

- DC power supplied via two feedthrough capacitors that also provide filtering.

- Input, output, and most other critical interstage matching is accomplished by the use of rf transformers wound around ferrite cores. Only one tuning adjustment is required dur to the relatively broadband matching characteristics of the ferrite transformers and the low inductance leads of the silicon opposed emitter transistors.

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Communications Division

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1301 E. Algonquin Road, Schaumburg, IL 60196

- One metering socket which is accessible from the component side of the circuit board allows four major test points to be monitored and permits measurement of the dc current drawn by the final amplifier stage.

- Due to the heat sink mounting requirements for this board, servicing is accomplished from the component side of the board.

- Diode protection against reverse polarity voltage (board mounted diode).

- Output protection provided by a control stage transistor driven by the power control circuit (Controls gain of the first stage). In intermittent duty stations, a single-wire provides interconnection between power control and PA circuitry. In continuous duty stations, three wires provide this interconnection.

2. FUNCTIONAL OPERATION

Refer to the block diagram, Figure 1, and the schematic diagram. This series of power amplifiers requires a 400 mW rf input from the exciter board. This input is passed through a bandpass filter assembly and a ferrite step-down transformer (to match the input impedance to the first stage) to the gain-controlled amplifier stage. The external power control circuit which drives the control stage transistor determines the gain of this stage. The power control circuit monitors the output of the final stages of the power amplifier, the load condition and the heat sink temperature.

The output of the gain-controlled amplifier is passed through a fixed-tuned broadband, matching network and applied to the pre-driver stage. A parallel capacitor network couples the output of the pre-driver to the base of the driver stage. The output of the driver stage is split by a transformer to drive the push-pull final power amplifier stage. The output from the final stage is stepped up in impedance by a ferrite transformer to provide the 50-ohm output impedance to match the input impedance of the harmonic filter.

Pin 1 of the metering receptacle provides a means of checking the incoming signal from the exciter. Pin 2 permits observation of the drive output of the first stage and an indication of the operation of the pre-driver stage. Pin 3 permits observation of the drive output of the pre-driver stage and an indication of the operation of the driver stage. Pin 4 reflects the drive signal and operation of the two push-pull power amplifier stages. Pin 5 permits observation of the collector currents of the push-pull final amplifier stages. Reference position A on a Motorola Portable Test Set uses pin 7 of the metering socket as an A+ reference against which the outputs of pins 1, 2, 3, and 4 are checked. Switch the test set to reference position B which uses pin 6 as a reference and then switch to meter position 5. This provides a reading across a calibrated resistor through which the current is drawn by the final amplifier stages.

3. MAINTENANCE

a. General

NOTE

Because of the complexity involved and time required to remove the PA board, compared to plug-in boards, it is not recommended that the PA board be removed. Proper trouble-shooting techniques will usually locate detective components "on the spot".

This section of the manual provides the maintenance shop procedures for the PA board.

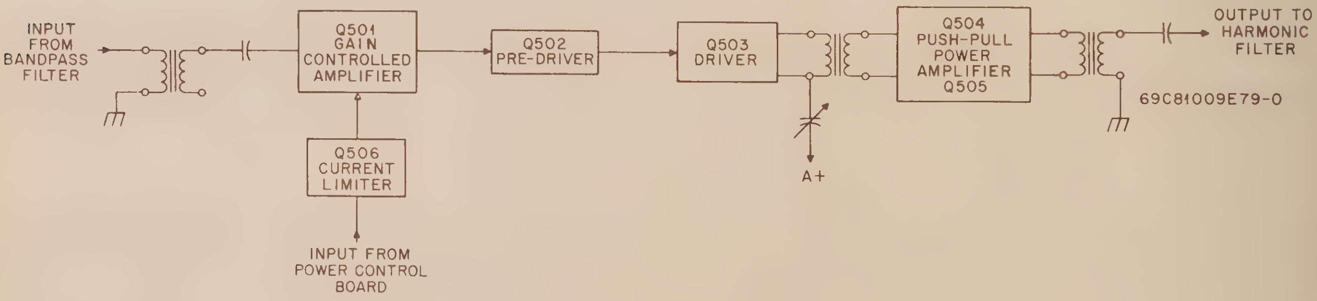
INPUT FROM BANDPASS FILTER
Q501 GAIN CONTROLLED AMPLIFIER
Q502 PRE-DRIVER
Q503 DRIVER
Q504 PUSH-PULL POWER AMPLIFIER Q505
OUTPUT TO HARMONIC FILTER
69C81009E79-0
A+
Q506 CURRENT LIMITER
INPUT FROM POWER CONTROL BOARD

Figure 1. Block Diagram

It assumes that preliminary tests have already localized the trouble to the PA board. These procedures include measurements with optional built-in station metering or a Motorola Portable Test Set, a vom, a complete set of performance tests, and extensive troubleshooting procedures.

CAUTION

The PA board must be installed in the transmitter for testing to provide the necessary power, ground, control, heat sinking and signal connections.

b. Recommended Test Equipment

The following test equipment is the minimum required for troubleshooting and adjusting the PA.

(1) Motorola S1056B through S1059B Portable Test Set and Model TEK-37 or TEK-37A Adapter Cable. The portable test set is required for checking each stage for proper operation. Optional built-in station metering, when incorporated, takes the place of the portable test set.

(2) A Motorola Solid-State DC Multimeter or a 20,000 ohm-per-volt multimeter should be used, however, a low impedance meter is acceptable for dc voltage measurements only.

(3) Motorola T1013A RF Load Resistor (dummy load) or equivalent.

c. Metering

The PA is equipped with a metering receptacle which allows five major test points to be measured. PA metering can be made at each of the five test points by merely rotating a selector switch on the built-in station metering kit or on the test set. A failure in almost any portion of the PA will produce a low or zero meter reading for one or more of the test points. Improper alignment will also cause improper meter readings.

(1) Using the Optional Built-In Station Meter

This procedure applies to intermittent duty stations. Continuous duty stations with built-in station metering are similar, except these stations measure only exciter output (PA input), PA current and PA voltage of the final devices.

(a) The entire transmitter is necessary for testing PA boards including the power board for proper control.

(b) The output of the station must be terminated in one of three types of loads:

-- The antenna load.

-- A dummy load such as Motorola's T1013A RF Load Resistor.

-- An RF Wattmeter.

NOTE

A dummy load is preferred to the antenna to eliminate the possibility of shutback by the power control board due to a defective antenna.

(c) Turn the station ON.

(d) With the meter panel selector switch set to the XMIT position and the transmitter chassis selector switch set to position 1, key the transmitter and observe the meter. Unkey the transmitter. Set the transmitter chassis selector switch to positions 2, 3, and 4, keying the transmitter and observing the meter reading for each position. On multi-frequency stations, repeat the readings for each frequency. An analysis of the meter readings for determining whether each circuit is good or bad is given in the MINIMUM PA METER READINGS table.

(2) Using the Portable Test Set

To make the measurements, the portable test set must be connected to the station as follows:

(a) Set the function selector switch of the portable test set to the XMTR position.

(b) Set the meter reversing switch of the test set to the METER REV position.

(c) Set the selector switch of the test set to position 1 and reference position A.

(d) Connect the 20-pin meter cable plug to the test set. When the test set is not in use, disconnect the 20-pin plug to conserve battery life. The plug acts as an on-off switch completing the battery circuit.

(e) Connect the red "control" plug of the adapter cable to the control receptacle on the local or remote control chassis circuit board. Connect the white "metering" plug of the adapter cable to the receptacle on the PA circuit board.

(f) The entire transmitter is necessary for testing PA boards including the power control board for proper control.

(g) The output of the station must be terminated in one of three types of loads:

-- The antenna load.

-- A dummy load such as Motorola's T1013A RF Load Resistor.

-- An RF Wattmeter.

NOTE

A dummy load is preferred to the antenna to eliminate the possibility of shutback by the power control board due to a defective antenna.

(h) Turn the station ON.

(i) Key the transmitter with the XMTR ON button on the test set. Observe the meter. Unkey the transmitter.

(j) Set the selector switch to positions 2, 3, and 4; then switch to reference position B and meter position 5 respectively, keying the transmitter and observing the meter reading for each. On multi-frequency stations repeat the readings for each frequency. An analysis of the meter readings for determining whether each circuit is good or bad follows.

Each time maintenance is performed on the PA the readings should be compared with the previous set of readings. Any degradation of performance will quickly be noted. Often, a lower reading may indicate an impending failure and corrective action may be taken before the circuit fails entirely.

d. Performance Tests

(1) No performance test of the power amplifier is required other than rf power output from the station as a whole. Before checking power output:

(a) The exciter board should be known to be functioning normally.

(b) The power control board should be known to be functioning normally.

(c) Antenna switch should be known to be operating normally (base stations only).

(2) Key the transmitter and observe power out, which should be 60 watts.

(3) If necessary, adjust POWER SET control for rated power output.

CAUTION

The PA shield must always be in place during operation of the station and should be kept in place as much as possible while testing and troubleshooting. The circuit board must always be secured in place with all mounting screws. The transistors (including the control stage transistor mounted on the inner wall) must be secured in place to provide proper heat sinking, and the feedthrough connectors must be soldered in place to provide dc power and good rf grounding.

4. TROUBLESHOOTING

If a problem has been localized to the PA deck, several checks can be made prior to extensive troubleshooting.

a. Visually

Visually check for obvious physical defects such as broken leads, broken plating, broken or disconnected components or overheated parts. Before any attempt is made to change parts, the circuit should be checked to insure that the problem causing the original failure has been identified and corrected, otherwise damage to the new part may occur.

b. Voltage Checks

Check for A+ and A- at the feedthrough connections and for the proper voltage at the collector of each transistor. Certain defects such as broken plating, broken leads, etc. may not be obvious to a visual inspection.

c. Troubleshooting

If test set readings are abnormal or tests indicate subnormal performance, a logical

MINIMUM PA METER READINGS

SELECTOR SWITCH POSITION	PORT. TEST SET REF. SW.	STATION METERING POL. SW.	MINIMUM METER READING	CIRCUIT METERED	IF LOW, THE DEFECTIVE CIRCUIT IS: (SEE TROUBLESHOOTING CHARTS)
1	A	REV	15 uA	RF output of exciter and collector voltage of controlled amplifier (PA input)	Exciter, controlled amplifier, or current limiter
2	A	REV	5 uA	Controlled amplifier output	Controlled amplifier or pre-driver
3	A	REV	10 uA	Pre-driver output	Pre-driver or driver
4	A	REV	13 uA	Driver output & power amplifier input	Driver or power amplifier
5	B	REV	25 uA min. 40 uA max.	Final amplifier output current	Final amplifier
6 (or 25 V See Note)	B	FWD	12 V (0-30 V scale)	Final amplifier voltage	Final amplifier A+ or A- input

NOTE: When using optional built-in station metering, the two voltage probes are used to measure PA voltages.

troubleshooting procedure is required to isolate the defective component efficiently. The accompanying troubleshooting chart summarizes these results in a logical sequence. A few voltage and resistance checks in the suspected circuit should readily isolate the defective component. Note that all power for the circuits in the PA is from A- referenced to A+ (not to chassis ground, this feature allows operation from positive or negative ground power sources when an optional positive ground converter is used).

CAUTION

Due to the voltage requirements of PNP transistors, all "rf ground" plating is A+ and is "hot" with respect to chassis ground in negative ground applications. Because of this, caution should be used to prevent connection to "ground" plating on the PA board to chassis ground, either directly or by the use of test equipment ground leads. If ac operated test equipment is used, the ground lead must not be electrically connected to ac line ground.

5. PA REPAIR NOTES

a. Resistance Measurement of Transistors In Push-Pull Pairs

Due to the fact that transistors in push-pull pairs are dc connected at the base, emitter and collector, BOTH devices should be measured individually when a defect in the pair is suspected.

b. Transistor Removal Procedure

(1) Unscrew both mounting screws from the base of the transistors. The nuts (for the mounting screws) on the reverse side of the shelf are captivated and will not fall out.

(2) Remove excess solder from around transistor tabs with a vacuum bulb type desoldering device.

(3) Gently lift each tab, one at a time while applying heat.

(4) When all four tabs are loose from the board carefully lift out the transistor.

c. Transistor Installation Procedure

(1) Pre-tin underside of each transistor lead.

(2) Apply a light coat of Wakefield Thermal Compound to the underside of the transistor mounting base and to the heat sink.

(3) Install the transistor making sure that all collector leads face the proper direction. Refer to the circuit board detail.

(4) Screw down the two mounting screws securely.

(5) Solder each transistor lead one at a time to the circuit board. The use of a generous amount of solder will insure a good contact of the entire tab to the board. Use care that solder does not bridge to other plating or that solder does not flow into the cutout in the circuit board.

d. Procedures for Resistance Measurements of Transistors

(1) Set ohmmeter to RX1, RX10, or RX100 scale (preferably RX10 if available).

(2) Measure the resistance from lead to lead as described:

(a) With the positive probe on the base, no indication (very high impedance) should be observed when the negative probe is touched to the collector or emitter. (Reverse drop measurement.)

(b) With the negative probe on the base, a relatively low impedance should be observed when touching the positive probe to the collector and emitter. (Forward drop measurement.)

(c) No indication should be observed from collector to emitter regardless of the polarity of the ohmmeter probes.

Should any indication be observed in measurements (a) or (c), the transistor is defective and should be replaced.

(5) Solder each transistor lead one at a time to the circuit board. The use of a generous amount of solder will insure a good contact of the entire tab to the board. Use care that solder does not bridge to other plating or that solder does not flow into the cutout in the circuit board.

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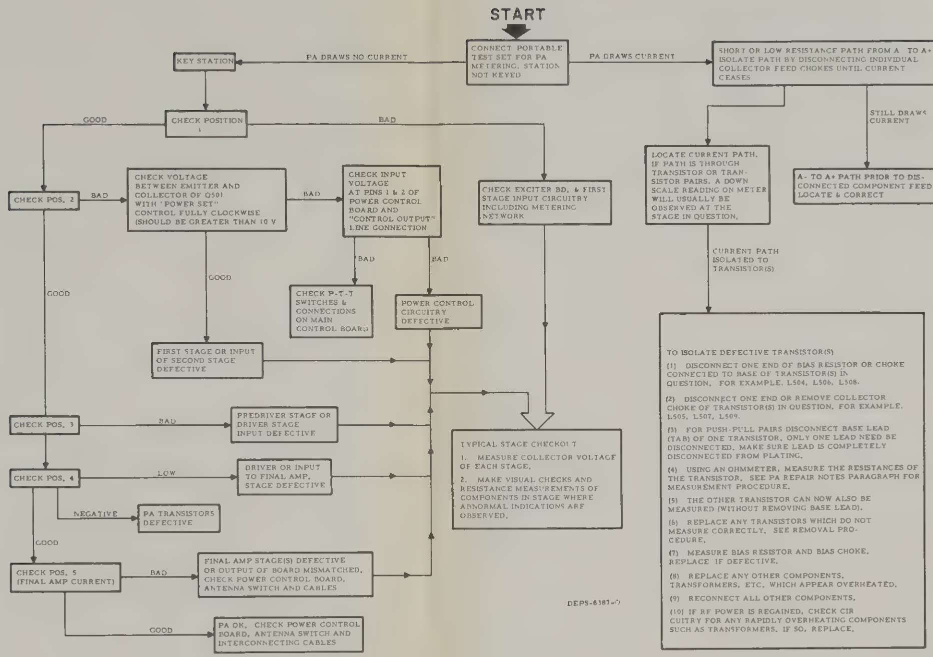

START
CONNECT PORTABLE TEST SET FOR PA METERING. STATION NOT KEYED
PA DRAWS NO CURRENT
PA DRAWS CURRENT
KEY STATION
CHECK POSITION 1
GOOD
BAD
CHECK POS. 2
BAD
CHECK VOLTAGE BETWEEN EMITTER AND COLLECTOR OF Q501 WITH "POWER SET" CONTROL FULLY CLOCKWISE (SHOULD BE GREATER THAN 10 V
BAD
CHECK INPUT VOLTAGE AT PINS 1 & 2 OF POWER CONTROL BOARD AND "CONTROL OUTPUT" LINE CONNECTION
CHECK EXCITER BD. & FIRST STAGE INPUT CIRCUITRY INCLUDING METERING NETWORK
BAD
BAD
GOOD
GOOD
CHECK P-T-T SWITCHES & CONNECTIONS ON MAIN CONTROL BOARD
POWER CONTROL CIRCUITRY DEFECTIVE
FIRST STAGE OR INPUT OF SECOND STAGE DEFECTIVE
CHECK POS. 3
BAD
PREDRIVER STAGE OR DRIVER STAGE INPUT DEFECTIVE
CHECK POS. 4
LOW
DRIVER OR INPUT TO FINAL AMP. STAGE DEFECTIVE
NEGATIVE
PA TRANSISTORS DEFECTIVE
GOOD
CHECK POS. 5 (FINAL AMP CURRENT)
BAD
FINAL AMP STAGE(S) DEFECTIVE OR OUTPUT OF BOARD MISMATCHED. CHECK POWER CONTROL BOARD, ANTENNA SWITCH AND CABLES
GOOD
PA OK. CHECK POWER CONTROL BOARD, ANTENNA SWITCH AND INTERCONNECTING CABLES
SHORT OR LOW RESISTANCE PATH FROM A- TO A+ ISOLATE PATH BY DISCONNECTING INDIVIDUAL COLLECTOR FEED CHOKES UNTIL CURRENT CEASES
STILL DRAWS CURRENT
LOCATE CURRENT PATH. IF PATH IS THROUGH TRANSISTOR OR TRANSISTOR PAIRS. A DOWN SCALE READING ON METER WILL USUALLY BE OBSERVED AT THE STAGE IN QUESTION.
A- TO A+ PATH PRIOR TO DISCONNECTED COMPONENT FEED LOCATE & CORRECT
CURRENT PATH ISOLATED TO TRANSISTOR(S)

TYPICAL STAGE CHECKOUT

1. MEASURE COLLECTOR VOLTAGE OF EACH STAGE.

2. MAKE VISUAL CHECKS AND RESISTANCE MEASUREMENTS OF COMPONENTS IN STAGE WHERE ABNORMAL INDICATIONS ARE OBSERVED.

TO ISOLATE DEFECTIVE TRANSISTOR(S)

(1) DISCONNECT ONE END OF BIAS RESISTOR OR CHOKE CONNECTED TO BASE OF TRANSISTOR(S) IN QUESTION. FOR EXAMPLE. L504, L506, L508.

(2) DISCONNECT ONE END OR REMOVE COLLECTOR CHOKE OF TRANSISTOR(S) IN QUESTION. FOR EXAMPLE. L505, L507, L509.

(3) FOR PUSH-PULL PAIRS DISCONNECT BASE LEAD (TAB) OF ONE TRANSISTOR, ONLY ONE LEAD NEED BE DISCONNECTED. MAKE SURE LEAD IS COMPLETELY DISCONNECTED FROM PLATING.

(4) USING AN OHMMETER, MEASURE THE RESISTANCES OF THE TRANSISTOR. SEE PA REPAIR NOTES PARAGRAPH FOR MEASUREMENT PROCEDURE.

(5) THE OTHER TRANSISTOR CAN NOW ALSO BE MEASURED (WITHOUT REMOVING BASE LEAD).

(6) REPLACE ANY TRANSISTORS WHICH DO NOT MEASURE CORRECTLY. SEE REMOVAL PROCEDURE.

(7) MEASURE BIAS RESISTOR AND BIAS CHOKE. REPLACE IF DEFECTIVE.

(8) REPLACE ANY OTHER COMPONENTS. TRANSFORMERS, ETC. WHICH APPEAR OVERHEATED.

(9) RECONNECT ALL OTHER COMPONENTS.

(10) IF RF POWER IS REGAINED, CHECK CIRCUITRY FOR ANY RAPIDLY OVERHEATING COMPONENTS SUCH AS TRANSFORMERS. IF SO, REPLACE.

DEPS-8387-0

EXCERPTS FROM FCC REG

FCC Regulations state that:

1. Radio transmitters may be tuned or adjusted only by
   cial radiotelephone operator's license or by personn

2. The power input to the final radio frequency stage s
   on the current station authorization. This power in

   a. When the transmitter is initially installed.
   b. When any change is made in the transmitter wh
   c. At intervals not to exceed one year.

3. Frequency and deviation of a transmitter must be ch

   a. When it is initially installed.
   b. When any change is made in the transmitter wh
      modulation characteristics.
   c. At intervals not to exceed one year.

NMENT PROCEDURE

UST	STAGE AND PROCEDURE
	Align the exciter.
	For complete power amplifier tune-up, proceed to step 3. To check alignment, go to step 7.
	PA PRE-ALIGNMENT - Set C501 fully clockwise.
ER	OUTPUT - Gradually rotate the POWER SET control until an initial meter 5 reading is observed. Do not readjust POWER SET control. If this indication is less than 50 uA, proceed with step 5. If greater than 50 uA, tune C501 for an on-scale reading.
ER	OUTPUT - Without exceeding rated power output of 60 watts on wattmeter or calibration label value on meter 1, adjust the POWER SET control for rated power or until no further increase in power output is observed. If PA meter 5 is greater than 25 uA, adjust POWER SET counterclockwise (if less than 15 uA, adjust POWER SET clockwise) until meter reading is between 15 and 25 uA.
	PA DRIVER OUTPUT - Tune C501 for minimum meter 5 reading.
ER	OUTPUT - Adjust the POWER SET control for rated power output and repeat step 6 (if rated power cannot be attained, repeat steps 5 and 6). Check meter reading, it must not exceed 50 uA.
	FINAL COLLECTOR CURRENT - The relationship between the meter reading and the actual current being measured is 50 uA = 10 A. Therefore, to measure the final collector current (I_c) in amperes, take 1/5 the meter reading.
	FINAL COLLECTOR VOLTAGE - Measure the final collector voltage (V_c). V_c is the meter 6 reading (0-30 V scale on test set, 25 V full scale on built-in metering).
	FINAL INPUT POWER (Pin) - Pin = V_cI_c and should be less than 120 watts.

Power Amplifier Alignment Procedure
Motorola No. PEPS-24480-O
7/18/77-UP

EXCERPTS FROM FCC REGULATIONS

FCC Regulations state that:

1. Radio transmitters may be tuned or adjusted only by persons holding a first or second class commercial radiotelephone operator's license or by personnel working under their immediate supervision.

The power input to the final radio frequency stage shall not exceed the maximum figure specified on the current station authorization. This power input shall be measured and the results recorded:

a. When the transmitter is initially installed.
b. When any change is made in the transmitter which may increase the power input.
c. At intervals not to exceed one year.

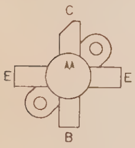
Frequency and deviation of a transmitter must be checked:

a. When it is initially installed.
b. When any change is made in the transmitter which may affect the carrier frequency or modulation characteristics.
c. At intervals not to exceed one year.

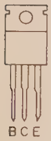
POWER AMPLIFIER ALIGNMENT PROCEDURE

		PORTABLE TEST SET		OPTIONAL BUILT-IN METERING			
STEP	METERING PLUG LOCATION	TEST SET SWITCH POSITION	ADAPTER CABLE SWITCH POSITION	METER SELECTOR SWITCH	POLARITY SWITCH	ADJUST	STAGE AND PROCEDURE
1	--	--	--	--	--	--	Align the exciter.
2	--	--	--	--	--	--	For complete power amplifier tune-up, proceed to step 3. To check alignment, go to step 7.
3	--	--	--	--	--	C501	PA PRE-ALIGNMENT - Set C501 fully clockwise.
4	POWER CONTROL BOARD	5	METER REV. REF B	PWR CONT 5	FWD	POWER SET C501	OUTPUT - Gradually rotate the POWER SET control until an initial meter 5 reading is observed. Do not readjust POWER SET control. If this indication is less than 50 uA, proceed with step 5. If greater than 50 uA, tune C501 for an on-scale reading.
5	POWER CONTROL BOARD	Wattmeter or 1 & 5	METER REV. REV A	PWR CONT 1	FWD	POWER SET	OUTPUT - Without exceeding rated power output of 60 watts on wattmeter or calibration label value on meter 1, adjust the POWER SET control for rated power or until no further increase in power output is observed. If PA meter 5 is greater than 25 uA, adjust POWER SET counterclockwise (if less than 15 uA, adjust POWER SET clockwise) until meter reading is between 15 and 25 uA.
6	POWER CONTROL BOARD	5	METER REV. REF B	PWR CONT 5	FWD	C501	PA DRIVER OUTPUT - Tune C501 for minimum meter 5 reading.
7	POWER CONTROL BOARD	Wattmeter or 1 5	METER REV. REF A METER REV. REF B	PWR CONT 1 PWR CONT 5	FWD FWD	POWER SET	OUTPUT - Adjust the POWER SET control for rated power output and repeat step 6 (if rated power cannot be attained, repeat steps 5 and 6). Check meter reading, it must not exceed 50 uA.
8	PA	5	METER REV. REF B	POWER AMP 5	REV	--	FINAL COLLECTOR CURRENT - The relationship between the meter reading and the actual current being measured is 50 uA = 10 A. Therefore, to measure the final collector current (I_C) in amperes, take 1/5 the meter reading.
9	PA	6	METER REV. REF B	25 V (use voltage probes)	FWD	--	FINAL COLLECTOR VOLTAGE - Measure the final collector voltage (V_C). V_C is the meter 6 reading (0-30 V scale on test set, 25 V full scale on built-in metering).
10	--	--	--	--	--	--	FINAL INPUT POWER (Pin) - Pin = $V_C I_C$ and should be less than 120 watts.

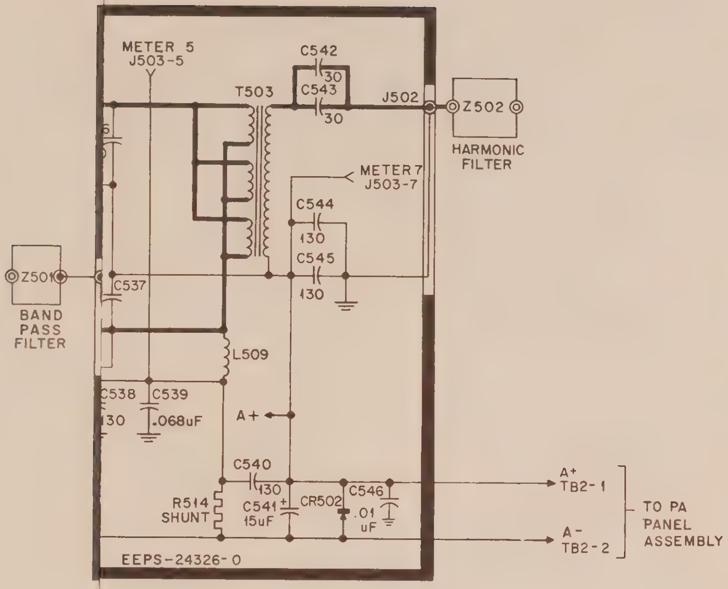
TRANSISTOR DETAILS



TOP VIEW

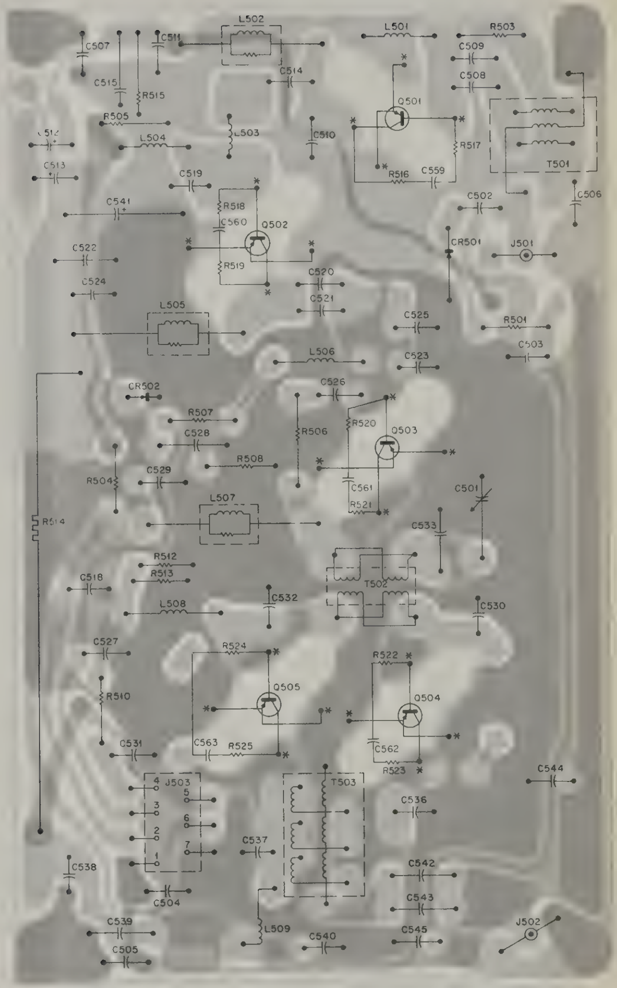


FRONT VIEW


METER 5
J503-5
C542
30
C543
30
T503
J502
Z502
HARMONIC
FILTER
METER 7
J503-7
C544
130
C545
130
Z501
BAND
PASS
FILTER
C537
L509
C538
130
C539
.068uF
A+
C540
130
R514
SHUNT
C541
15uF
CR502
C546
.01
uF
A+
TB2-1
A-
TB2-2
TO PA
PANEL
ASSEMBLY
EEPS-24326-0

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

60-Watt Power Amplifier
Schematic Diagram
Motorola No. 63P81036E21-O
7/18/77-UP


L502
L501
R503
C507
C511
C509
C508
C514
C515
R515
Q501
R505
L503
C510
C512
L504
R517
C513
C519
R516
C559
T501
C541
R518
C506
C502
C560
Q502
C522
CR501
J501
R519
C520
C524
C521
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C525
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R512
R513
T502
C518
C532
C530
L508
C527
R524
R522
Q505
Q504
R510
C531
C563
R525
C562
R523
C544
J503
1
2
3
4
5
6
7
T503
C536
C537
C542
C538
C543
C504
C539
J502
L509
C540
C545
C505

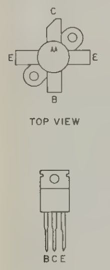
SHOWN FROM COMPONENT SIDE

⊗ SOLDER SIDE

OL-DEPS-24329-0

* THESE TRANSISTOR LEADS ARE CONNECTED TO ONLY THE COMPONENT SIDE OF THE BOARD

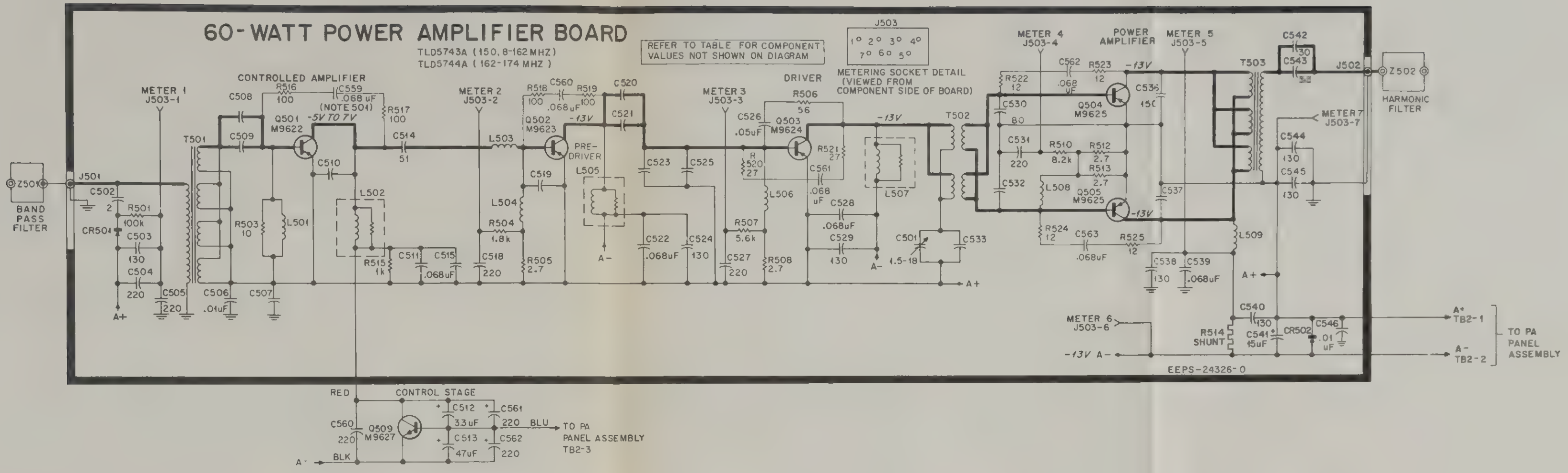
TRANSISTOR DETAILS



TOP VIEW

FRONT VIEW

60-Watt Power Amplifier
Circuit Board Detail
Motorola No. PEPS-24481-O
7/18/77-UP


60-WATT POWER AMPLIFIER BOARD
TLD5743A (150, 8-162 MHZ)
TLD5744A (162-174 MHZ)
REFER TO TABLE FOR COMPONENT VALUES NOT SHOWN ON DIAGRAM
J503
1° 2° 3° 4°
7° 6° 5°
METERING SOCKET DETAIL (VIEWED FROM COMPONENT SIDE OF BOARD)
Z501
BAND PASS FILTER
J501
METER 1 J503-1
C502 2
R501 100k
CR501
C503 130
C504 220
A+
C505 220
T501
CONTROLLED AMPLIFIER
C508
C509
R516 100
C559 .068 uF
(NOTE 501)
Q501 M9622
-5V TO 7V
R517 100
C510
R503 10
L501
C506 .01uF
C507
L502
R515 1k
C511
C515 .068uF
C514 51
METER 2 J503-2
L503
C518 220
R504 1.8k
L504
R505 2.7
R518 100
C560 .068uF
R519 100
Q502 M9623
-13V
PRE-DRIVER
C519
L505
A-
C520
C521
C523
C525
C522 .068uF
C524 130
METER 3 J503-3
DRIVER
R506 56
C526 .05uF
Q503 M9624
R 520 27
R521 27
C561 .068 uF
L506
R507 5.6k
C527 220
R508 2.7
C528 .068uF
C529 130
-13V
L507
T502
C501 1.5-18
C533
A+
METER 4 J503-4
POWER AMPLIFIER
R522 12
C562 .068 uF
R523 12
-13V
Q504 M9625
C536 150
C530 80
C531 220
R510 8.2k
R512 2.7
R513 2.7
C532
L508
Q505 M9625
-13V
C537
R524 12
C563 .068uF
R525 12
METER 5 J503-5
C538 130
C539 .068uF
L509
T503
C542 30
C543
J502
Z502
HARMONIC FILTER
METER 7 J503-7
C544 130
C545 130
A+
C540 130
C541 15uF
CR502
C546 .01 uF
METER 6 J503-6
R514 SHUNT
-13V A-
A+ TB2-1
A- TB2-2
TO PA PANEL ASSEMBLY
EEPS-24326-0
RED
CONTROL STAGE
C560 220
Q509 M9627
C512 33uF
C513 47uF
C561 220
C562 220
BLU
TO PA PANEL ASSEMBLY TB2-3
A-
BLK

POWER AMPLIFIER

501. VOLTAGES DEPENDENT UPON AMOUNT OF CUTBACK FROM POWER CONTROL BOARD.
502. VOLTAGES MEASURED IN RESPECT TO A+ UNLESS OTHERWISE SPECIFIED.
503. UNLESS OTHERWISE SPECIFIED: CAPACITOR VALUES ARE IN PICOFARADS.

NEPS-24328-O

PA COMPONENT VALUES

REFERENCE SYMBOL	150.8-162 MHz	162-174 MHz
C507	390	39
C508	51	60
C509	49	34
C510	15	13
C511	130	NOT USED
C519	91	75
C520	39	34
C521	39	30
C523	75	60
C525	39	34
C532	80	60
C533	25	15
C537	150	130
L502	24-843 92B03	24-843 92B01
L506	0.29 uH	1-1/2 TURNS

NEPS-24327-O

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

60-Watt Power Amplifier
Schematic Diagram
Motorola No. 63P81036E21-O
7/18/77-UP

.RENCE MBOL	MOTOROLA PART NO.	DESCRIPTION

69A Hardware & Heat Sink Kit,
A PL-5509-O

		CAPACITOR, fixed: feedthru type:
	21-84211B02	.01 uF; 250 V
		TRANSISTOR: (SEE NOTE)
	48-869622	PNP; type M9622
	48-869623	PNP; type M9623
	48-869624	PNP; type M9624
05	48-869625	PNP; type M9625
	NON-REFERENCED ITEMS	
	3-114406	SCREW, cap: 4-40 x 5/16"; 10 used
	3-134184	SCREW, tapping: 4-40 x 5/16" (w/internal lockwasher); 4 used
	3-134212	SCREW, tapping: 4-40 x 5/16" (w/external lockwasher); 8 used
	3-139000	SCREW, machine: 10-32 x 1-1/2"; 2 used
	4-115362	WASHER, lock: #10 (external tooth) 2 used
	4-801846	WASHER, insulating
	7-83269L01	BRACKET, hinge
	14-84020C01	INSULATOR, circuit board
	26-84170G02	HEAT SINK
	42-82234G01	RING, cord: 2 used

444A Resistor-Capacitor Kit PL-5510-O

		CAPACITOR, fixed:
thru 563	8-83813H05	.068 uF ±10%; 100 V
		RESISTOR, fixed: ±10%; 1/2 W:
thru 519	6-125C25	100
521	6-125C11	27
thru 525	6-125C03	12

r Output Filter PL-1741-O

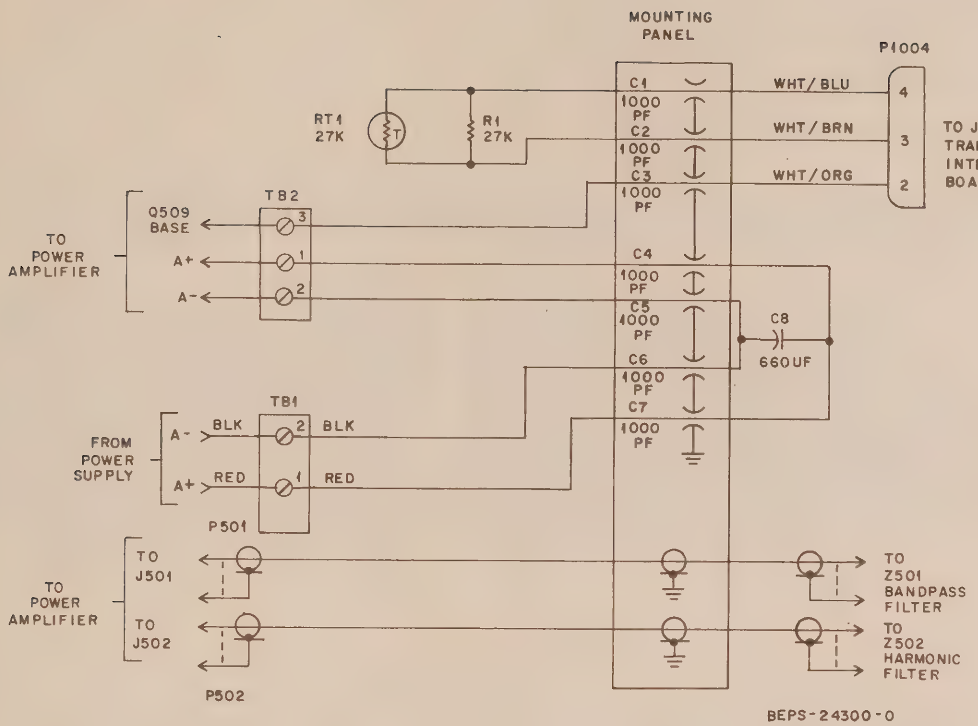
	TFD6112A	FILTER, RF: bandpass; 150.8-174 MHz

itput (Harmonic) Filter PL-1742-O

	TFD6102A	FILTER, RF: low-pass 150.8-174 MHz

:

placement diodes and transistors must be ordered
Motorola part number only for optimum
rformance.


MOUNTING PANEL
P1004
C1
1000 PF
C2
1000 PF
C3
1000 PF
C4
1000 PF
C5
1000 PF
C6
1000 PF
C7
1000 PF
WHT/BLU
WHT/BRN
WHT/ORG
4
3
2
TO J1004 ON TRANSMITTER INTERCONNECT BOARD
RT1 27K
R1 27K
TB2
Q509 BASE
A+
A-
3
1
2
TO POWER AMPLIFIER
C8
660UF
TB1
FROM POWER SUPPLY
A-
A+
BLK
RED
2
1
BLK
RED
P501
TO J501
TO J502
TO POWER AMPLIFIER
P502
TO Z501 BANDPASS FILTER
TO Z502 HARMONIC FILTER
BEPS-24300-0

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

TRN6971A and TRN6973A
PA Panel Assembly
Schematic Diagram
Motorola No. 63P81036E11-O
7/18/77-UP

PARTS LIST

LEGEND:
H = (150.8-162 MHz)
HH = (162-174 MHz)

TLD5743A Power Amplifier Board (150.8-162 MHz)
TLD5744A Power Amplifier Board (162-174 MHz)
PL-5508-O

NOTE

This parts list covers two models of the Power Amplifier Board. Where differences exist a letter code is added to the reference symbol to indicate the applicable unit.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: pF; ±5%; 500 V: unless otherwise stated
C501	20-83201B07	variable; 1.5-18; 100 V
C502	21-83406D52	2 ±0.25 pF; NP0
C503	21-84494B26	130
C504	21-83596E10	220 ±20%
C505	21-83596E10	220 ±20%
C506	21-82428B59	.01 uF +80-20%; 200 V
C507H	21-84494B18	390
C507HH	21-84494B24	39
C508H	21-84494B01	51
C508HH	21-84494B35	60
C509H	21-84494B25	49
C509HH	21-84494B30	34
C510H	21-84494B38	15
C510HH	21-84494B36	13
C511H	21-84494B26	130
C511HH		NOT USED
C512	23-83214C17	3.3 uF ±20%; 25 V
C513	23-83214C10	47 uF ±20%; 6 V
C514	21-84494B01	51
C515	8-83813H05	.068 uF ±10%; 100 V
C518	21-83596E10	220 ±20%
C519H	21-84494B52	91
C519HH	21-84494B31	75
C520H	21-84494B24	39
C520HH	21-84494B30	34
C521H	21-84494B24	39
C521HH	21-84494B33	30
C522	8-83813H05	.068 uF ±10%; 100 V
C523H	21-84494B31	75
C523HH	21-84494B35	60
C524	21-84494B26	130
C525H	21-84494B24	39
C525HH	21-84494B30	34
C526	21-82372C04	.05 uF +80-20%; 25 V
C527	21-83596E10	220 ±20%
C528	8-83813H05	.068 uF ±10%; 100 V
C529	21-84494B26	130
C530	21-84395B03	80; 250 V
C531	21-83596E10	220 ±20%
C532H	21-84395B03	80; 250 V
C532HH	21-84395B07	60; 250 V
C533H	21-84936A04	25; 2000 V, P120
C533HH	21-84936A07	15; 2000 V; P120
C536	21-84395B06	150; 250 V
C537H	21-84395B06	150; 250 V
C537HH	21-84395B05	130; 250 V
C538	21-84494B26	130
C539	8-83813H05	.068 uF ±10%; 100 V
C540	21-84494B26	130
C541	23-83210A21	15 uF +150-10%; 25 V
C542	21-84936A06	30 ±1.5 pF; 2000 V; P120
C543	21-84936A06	30 ±1.5 pF; 2000 V; P120
C544	21-84494B26	130
C545	21-84494B26	130
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR501	48-82139G01	germanium
CR502	48-82525G13 or48-82525G01	silicon
		CONNECTOR, receptacle:
J501, 502	9-84231B03	phono
J503	9-84207B01	female; 7-contact
		COIL, RF:
L501	24-83961B01	choke; consists of a ferrite core with a 3-turn winding
L502H	24-84392B03	choke; consists of a resistor (82 ohms ±10%; 1 watt) covered with a 6-turn winding
L502HH	24-84392B01	choke; consists of a resistor (120 ohms ±10%; 1 watt) covered with a 6-turn winding
L503	24-83884G03	choke; 1-1/2 turns, molded
L504	24-83961B01	choke; consists of a ferrite core with a 3-turn winding
L505	24-84392B02	choke; consists of a resistor (39 ohms ±10%; 2 watt) covered with a 4-turn winding
L506H	24-82723H04	choke; 0.29 uH
L506HH	24-83977B01	choke; 1-1/2 turns on ferrite body
L507	24-84392B04	choke; consists of a resistor (100 ohms ±10%; 2 watt) covered with a 4-turn winding
L508	24-83977B01	choke; 1-1/2 turns on ferrite body
L509	24-84393B02	choke; 5-1/2 turns
		RESISTOR, fixed: ±10%; 1/4 W: unless otherwise stated
R501	6-124D97	100k
R503	6-124A01	10 ±5%
R504	6-124C55	1.8k
R505	6-124B55	2.7 ±5%
R506	6-125C19	56; 1/2 W
R507	6-124C67	5.6k
R508	6-124B55	2.7 ±5%
R510	6-124C71	8.2k
R512	6-124B55	2.7 ±5%
R513	6-124B55	2.7 ±5%
R514	6-84232B02	(mter shunt)
R515	6-124C49	1k
		TRANSFORMER, RF:
T501	25-84396B01	pri: 5 turns sec: 4 windings, 1 turn each
T502	25-84818B01	pri: 2 windings, 1-3/4 turns each: sec: 2 windings; 1-3/4 turns each
T503	25-84012C01	pri: 3 windings, 1-1/2 turns each: sec: 4 turns

TRN6969A Hardware & Heat Sink Kit, 60 W PA
PL-5509-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: feedthru type:
C546	21-84211B02	.01 uF; 250 V
		TRANSISTOR: (SEE NOTE)
Q501	48-869622	PNP; type M9622
Q502	48-869623	PNP; type M9623
Q503	48-869624	PNP; type M9624
Q504, 505	48-869625	PNP; type M9625
	NON-REFERENCED ITEMS	
	3-114406	SCREW, cap: 4-40 x 5/16"; 10 used
	3-134184	SCREW, tapping: 4-40 x 5/16" (w/internal lockwasher); 4 used
	3-134212	SCREW, tapping: 4-40 x 5/16" (w/external lockwasher); 8 used
	3-139000	SCREW, machine: 10-32 x 1-1/2"; 2 used
	4-115362	WASHER, lock: #10 (external tooth) 2 used
	4-801846	WASHER, insulating
	7-83269L01	BRACKET, hinge
	14-84020C01	INSULATOR, circuit board
	26-84170G02	HEAT SINK
	42-82234G01	RING, cord: 2 used

TRN6444A Resistor-Capacitor Kit
PL-5510-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C559 thru 563	8-83813H05	.068 uF ±10%; 100 V
		RESISTOR, fixed: ±10%; 1/2 W:
R516 thru 519	6-125C25	100
R520, 521	6-125C11	27
R522 thru 525	6-125C03	12

Exciter Output Filter
PL-1741-O

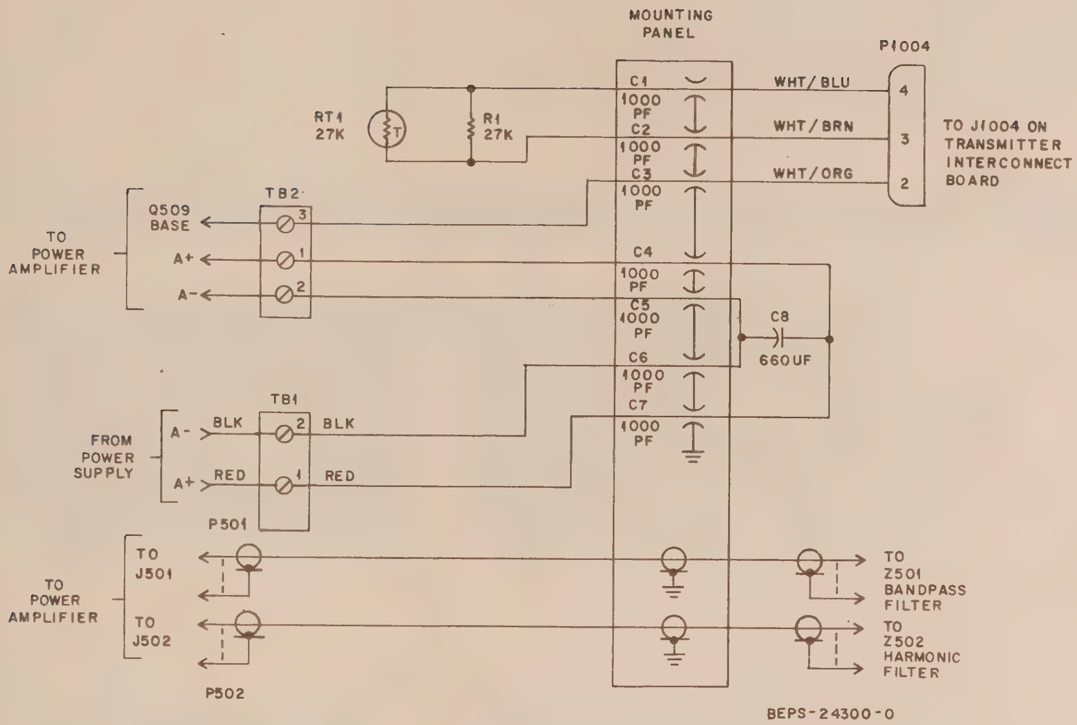
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
Z501	TFD6112A	FILTER, RF: bandpass; 150.8-174 MHz

PA Output (Harmonic) Filter
PL-1742-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
Z502	TFD6102A	FILTER, RF: low-pass 150.8-174 MHz

NOTE:

Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.


MOUNTING PANEL
P1004
C1
1000 PF
C2
1000 PF
C3
1000 PF
C4
1000 PF
C5
1000 PF
C6
1000 PF
C7
1000 PF
C8
660UF
RT1 27K
R1 27K
WHT/BLU
WHT/BRN
WHT/ORG
4
3
2
TO J1004 ON TRANSMITTER INTERCONNECT BOARD
TB2
Q509 BASE
A+
A-
TO POWER AMPLIFIER
TB1
FROM POWER SUPPLY
A-
A+
BLK
RED
BLK
RED
P501
TO J501
TO J502
TO POWER AMPLIFIER
P502
TO Z501 BANDPASS FILTER
TO Z502 HARMONIC FILTER
BEPS-24300-0

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

TRN6971A and TRN6973A
PA Panel Assembly
Schematic Diagram
Motorola No. 63P81036E11-O
7/18/77-UP

PARTS LIST

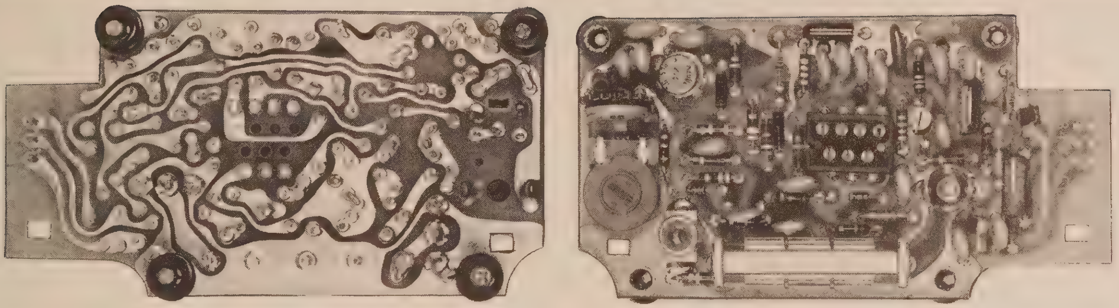
TRN6971A Panel Assembly, PA
TRN6973A Panel Assembly, PA PL-5511-O

NOTE
This parts list covers two models of the PA Panel Assembly. Where differences exist the model number of the applicable unit is given in the Description column.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C1 thru 7	21-82812H03	1000 pF +100-0%; 500 V
C8	23-83210A22	660 uF +150-10%; 25 V
		CONNECTOR, plug:
P501, 502	28-82331G02	phono
P1004	-	includes:
	15-83498F07	HOUSING, connector
	29-83499F01	CONTACT, terminal: 3 used
	46-84549F01	PLUG, polarizing
		RESISTOR, fixed:
R1	6-124C83	27k ±10%; 1/4 W (TRN6971A only)
		THERMISTOR:
RT1	6-867628	194k @ 25°C
		TERMINAL BOARD:
TB1	31-83272L01	2-terminal
TB2	31-84094L01	3-terminal
	NON-REFERENCED ITEMS	
	1-80797B33	CABLE ASSEMBLY includes:
	42-10217A02	STRAP, tie: .091 x 3.62"; 2 used
		CONNECTOR P1004
	1-80797B36	PANEL ASSEMBLY includes:
	64-83271L01	PANEL, mounting
		CAPACITORS C1 thru C7
	1-80797B38	CABLE ASSEMBLY, PA Input includes:
	30-83794C01	CABLE, coaxial: 15-1/2" used
		CONNECTOR P501
	1-80797B39	CABLE ASSEMBLY, PA Output includes:
	30-83794C01	CABLE, coaxial: 14" used
		CONNECTOR P502
	3-134184	SCREW, tapping: 4-40 x 5/16" 2 used
	3-134268	SCREW, tapping: 4-40 x 7/16" 2 used
	3-138162	SCREW, tapping: 4-40 x 3/8"; 4 used
	28-82331G02	CONNECTOR, plug: phono; 2 used
	30-858552	CABLE, battery: #12 (black); 7" used
	30-858553	CABLE, battery: #12 (red); 6.5" used
	42-84284B01	RETAINER, screw: 4 used

POWER CONTROL BOARD

MODELS TLD8610A & TLD8620A
TLD8610AV & TLD8620AV
& TLD5960A


TOP VIEW

BOTTOM VIEW

FAEPS-6127-A

MODEL TABLE

MODEL	POWER RANGE
TLD8610A & TLD8610AV	60 W
TLD8620A & TLD8620AV	90/110 W Intermittent
TLD5960A	100 W Continuous

1. DESCRIPTION

The solid-state power control board provides regulation and protection for the rf transistors. One model is used with all 60-watt stations--the other model is used with 100-watt continuous duty stations and 90 or 110-watt intermittent duty stations. The following four functions are provided by the circuitry.

--Power Leveling - The board permits the adjustment of the output of the power amplifier to the proper level and then maintains that level of output regardless of power or supply voltage fluctuations as long as the gain of the power amplifier is equal to, or above, the preset level.

--VSWR Protection - A voltage standing wave ratio (VSWR) detector operates during transmitting periods to prevent over-dissipation of the final amplifier transistors should a fault occur in the antenna circuit. The circuitry compares power reflected from the antenna circuit to forward (output) power. When this ratio exceeds a predetermined amount, the output of the circuit lowers the power output of the power amplifier.

--Temperature Protection (Intermittent Only) -- A portion of the circuitry continually monitors heat sink temperature. When a temperature of approximately 80°C is reached, the power control board begins to reduce the power amplifier output to prevent damage to the final stage

POWER CONTROL BOARD

MOTOROLA INC.
Communications Division

service publications
1301 E. Algonquin Road, Schaumburg, IL 60196

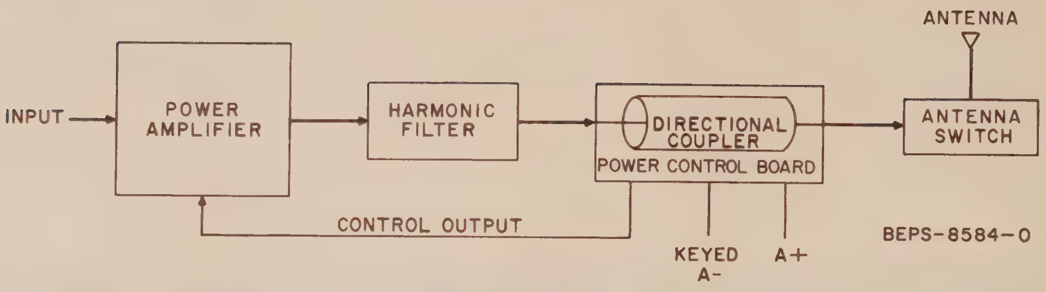

ANTENNA
INPUT
POWER AMPLIFIER
HARMONIC FILTER
DIRECTIONAL COUPLER
POWER CONTROL BOARD
ANTENNA SWITCH
CONTROL OUTPUT
KEYED A-
A+
BEPS-8584-0

Figure 1.
Loop Block Diagram

power transistors. Any further increase in heat sink temperature will cause a correspondingly greater decrease in power output. A reduced power output level will be maintained until the heat sink temperature drops below 80°C. Thermal protection is not needed on the continuous duty version due to the large heat exchanger used.

--Forward and Reverse Power Metering- Metering points on the board provide a means of monitoring the amount of forward (output) and reflected (reverse) power in the load system.

The power control board is constructed on a single circuit board which is easily removed and replaced. All external connections are made by two coaxial connectors (input and output for the dual directional coupler) and three pins which plug into the control board. All metering points and the single adjustment point are accessible from the plating side of the board.

2. FUNCTIONAL OPERATION

Refer to the loop block diagram, Figure 1. The circuitry operates as a control loop which continually monitors the output from the final stages of the transmitter power amplifier and controls that output by regulating the gain of the first stage of the power amplifier.

Refer to the block diagram, Figure 2. The output of the integrated circuit differential amplifier, amplified by the dc amplifier is the controlling input to the power amplifier board.

The output of the differential amplifier is determined by the potentials present on the non-inverting (+) and inverting (-) inputs. These potentials are developed by the power control board circuitry in the following manner.

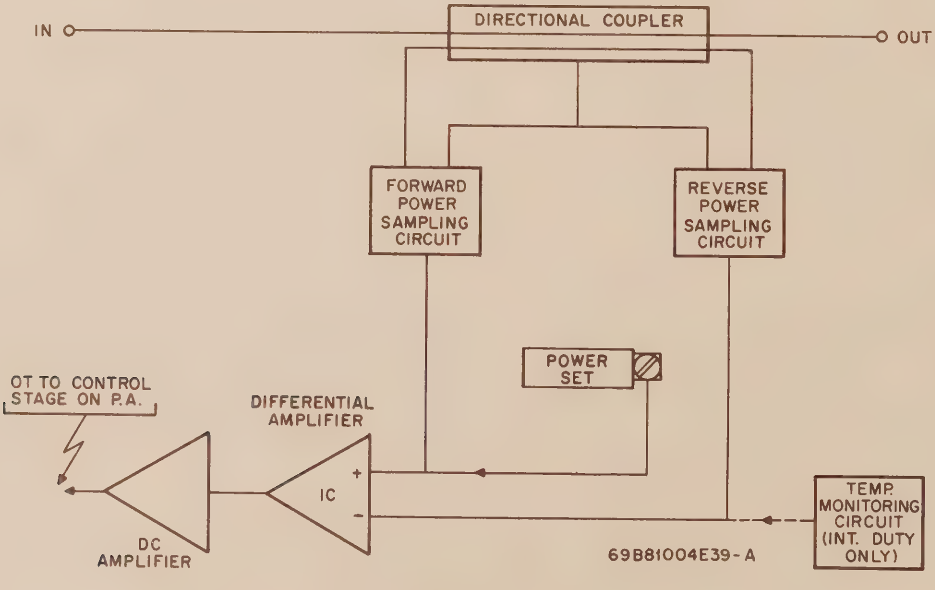

IN
DIRECTIONAL COUPLER
OUT
FORWARD POWER SAMPLING CIRCUIT
REVERSE POWER SAMPLING CIRCUIT
POWER SET
OT TO CONTROL STAGE ON P.A.
DIFFERENTIAL AMPLIFIER
+
IC
-
DC AMPLIFIER
TEMP. MONITORING CIRCUIT (INT. DUTY ONLY)
69B81004E39-A

Figure 2.
Power Control Board Block Diagram

When the impedances of the antenna circuitry (load) and the power amplifier are matched (a VSWR of 1:1), and the heat sink temperature is below 80°C (for intermittent duty stations), a bias voltage produced by the dc reference bias circuitry is placed on the inverting input (also called the "reference input") of the differential amplifier (see Figure 5).

When the transmitter is keyed, the forward (output) power from the final stages of the power amplifier is fed through the directional coupler to the antenna circuit. This flow of power is sampled by the forward power sampling circuitry and places a bias, proportional to the forward power, on the non-inverting input (pin 5) of the differential amplifier. The POWER SET potentiometer is then adjusted, changing the potential on the non-inverting input. As this voltage changes, relative to the reference input voltage, the output of the differential amplifier changes, in turn changing the loop control level and therefore the output of the power amplifier.

Once the power has been set to the proper level, any change in the output power will be instantly corrected by the circuitry. If the power increases, the increase causes the differential amplifier output voltage to increase, decreasing the output from the dc amplifier which decreases the gain of the power amplifier until the output returns to the preset level. A decrease in transmitter power amplifier output causes the reverse action.

Any power reflected back from the antenna circuit is detected by the reverse power sampling circuit. Reverse power causes a negative current to flow, which, in turn, decreases the potential on the reference input of the differential amplifier. Therefore, increasing levels of reflected power will cause the transmitter power output to be decreased to a safe level.

On intermittent duty stations, temperature increases detected by the temperature monitoring circuit will also decrease the reference level at the inverting input of the differential amplifier, reducing the output power as the heat sink temperature increases above a safe operating point for the power transistors. The higher the temperature, the more the decrease in power out. If the output has been reduced due to temperature, the VSWR circuit becomes more sensitive to reverse power, thus providing further protection for the rf power amplifier transistors.

3. CIRCUIT DESCRIPTION

a. Bias Circuitry

Since the power control board has the capability to regulate the output of the transmitter power amplifier from a completely cut-off state to above the rated output power, a definite controlled output level is necessary whenever the transmitter is keyed. The desired controlled output level is determined by bias voltages present on the inverting and non-inverting inputs of the differential amplifier IC601 (see Figure 3.). Under

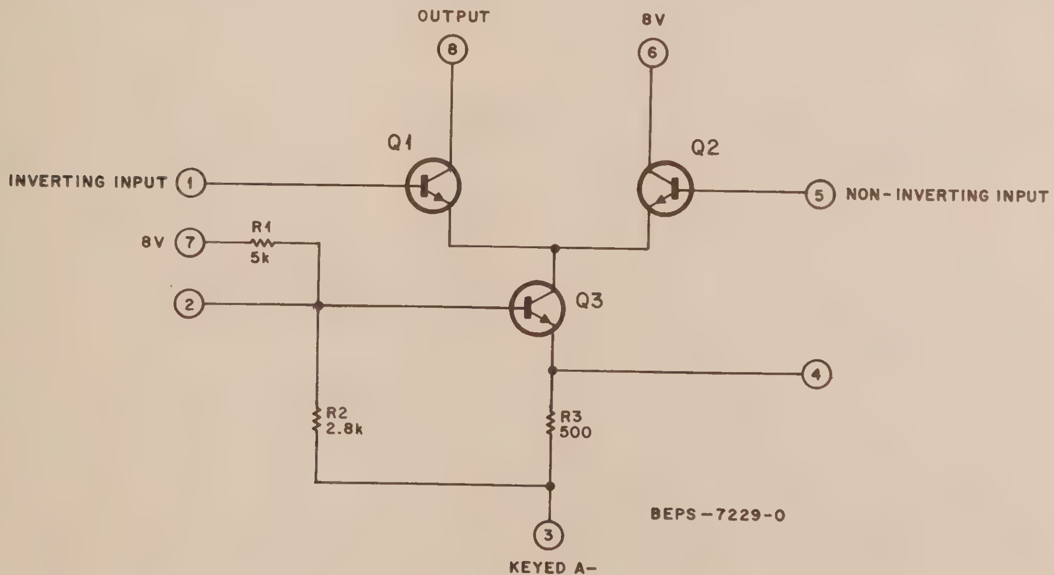


Figure 3.
IC601 Schematic Diagram

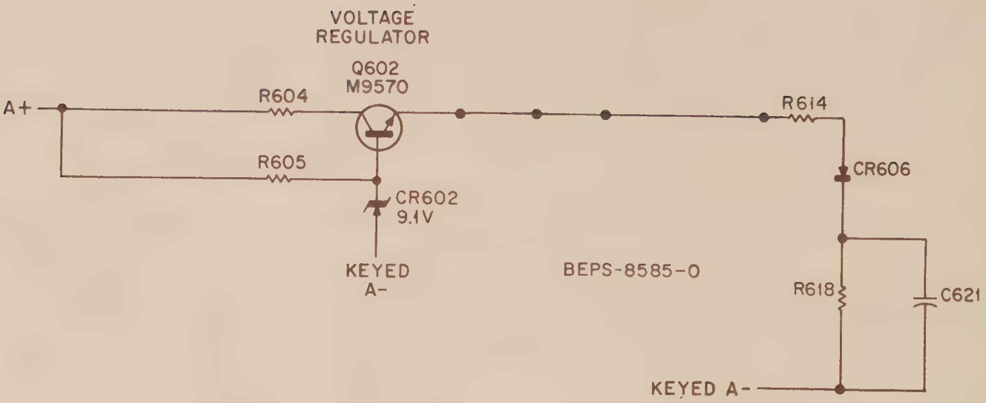

VOLTAGE REGULATOR
Q602
M9570
A+
R604
R605
CR602
9.1V
KEYED
A-
R614
CR606
BEPS-8585-0
R618
C621
KEYED A-

Figure 4.
Voltage Regulator and Main Divider Line

normal operating conditions (1:1 VSWR; 100% rated power out and normal heat sink temperature on intermittent duty stations) the bias on the differential amplifier inputs are developed as described in the following paragraphs.

(1) Voltage Regulator and Main Divider Line

Refer to Figure 4. The A+ supply to the board is regulated by a series regulator circuit providing a nominal voltage of 8.0 volts. The Zener diode holds the base of the series pass transistor at a fixed potential. The series pass transistor operates as a variable resistor to hold the input to the reference circuitry constant. The divider consisting of the two resistors and the diode provides the proper voltage tap points for the secondary voltage divider networks. All 220 pF capacitors in the board are used as rf bypasses.

(2) Reference Bias Circuit

Refer to Figure 5. The reference bias is developed (with a 1:1 VSWR and normal heat sink temperature on intermittent duty stations) by the voltage divider made up of two resistors and a diode between the regulated supply voltage and the switched A- source. Since A+ is applied to the board continuously and A- is only applied when the transmitter is keyed by the push-to-talk

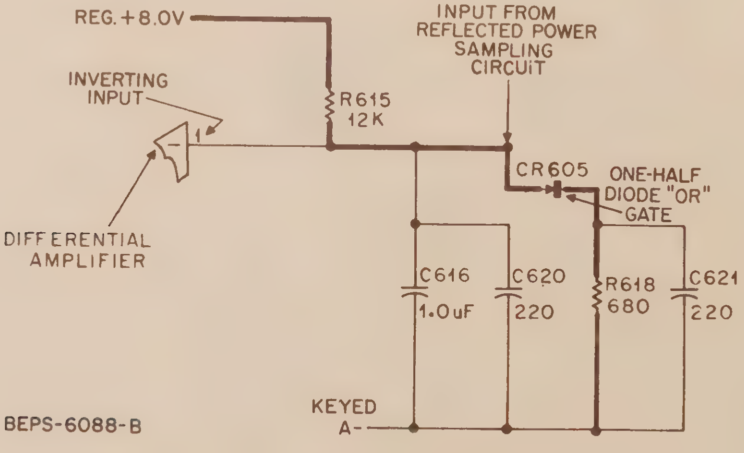

REG. +8.0V
INVERTING INPUT
DIFFERENTIAL AMPLIFIER
R615
12K
INPUT FROM REFLECTED POWER SAMPLING CIRCUIT
CR605
ONE-HALF DIODE "OR" GATE
C616
1.0uF
C620
220
R618
680
C621
220
KEYED
A-
BEPS-6088-B

Figure 5.
Reference Power Bias Circuit

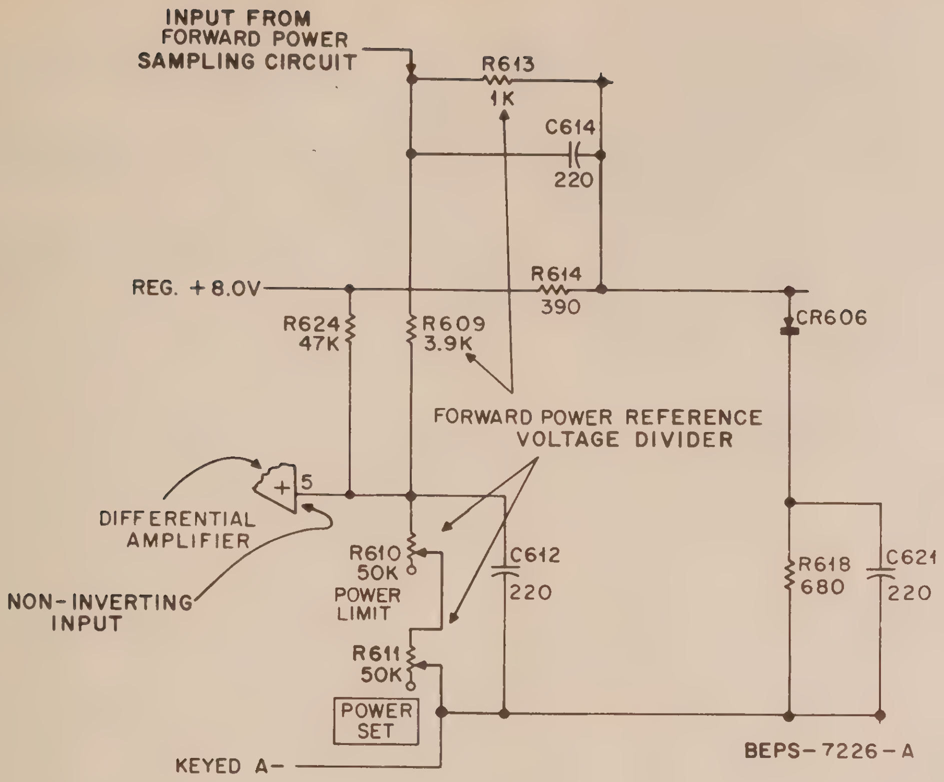

INPUT FROM FORWARD POWER SAMPLING CIRCUIT
R613
1K
C614
220
REG. +8.0V
R614
390
R624
47K
R609
3.9K
CR606
FORWARD POWER REFERENCE VOLTAGE DIVIDER
+
5
DIFFERENTIAL AMPLIFIER
NON-INVERTING INPUT
R610
50K
POWER LIMIT
C612
220
R618
680
C621
220
R611
50K
POWER SET
KEYED A-
BEPS-7226-A

Figure 6.
Forward Power Bias Circuit

switch, the larger capacitor connected between the inverting input and keyed A- provides a time constant which allows the inverting input bias to build up slowly when power is first applied. This prevents full power output from occurring until the leveling circuitry can react and reach a quiescent level.

b. Directional Coupler

The directional coupler measures the voltage and the current traveling in both directions. The detection of forward (output) power causes a proportional voltage bias that is combined with the voltage-divider generated bias to set the potential on the non-inverting input of the differential amplifier. Any reverse power detected causes the VSWR circuitry to decrease the power output.

c. Protection Circuitry

(1) Forward Power Bias and Detection Circuit

Refer to Figure 6. The forward power reference voltage divider comprised of two resistors and two potentiometers provides a stable potential that supplies a dc bias to the non-inverting input of the differential amplifier. With an approximately correct power output from the final stages of the power amplifier, a dc level proportional to that power is produced by the forward power detector circuit, which, in combination with the voltage developed by the voltage divider, produces a bias on the non-inverting input that can be adjusted by the POWER SET potentiometer. The POWER LIMIT control is pre-set to prevent over-dissipation if the POWER SET control should be set to maximum. (Refer to the CAUTION preceding maintenance information in this section.) The dc bias value will be determined by the power amplifier output and, with no reflected power (VSWR 1:1), balanced against the reference bias present on the inverting input of the differential amplifier. Once the bias has been set, and change in power output will change the bias on the non-inverting input causing the differential amplifier to compensate for the deviation. The forward power detector circuit (refer to Figure 7) detects rf power flowing through the directional coupler when the transmitter is keyed, and causes a small proportional current flow in the forward power sampling circuit. The diode converts the rf sample into a pulsating dc voltage and the dc filter removes the ripple. This is the dc voltage which is added to the dc bias already applied to the non-inverting

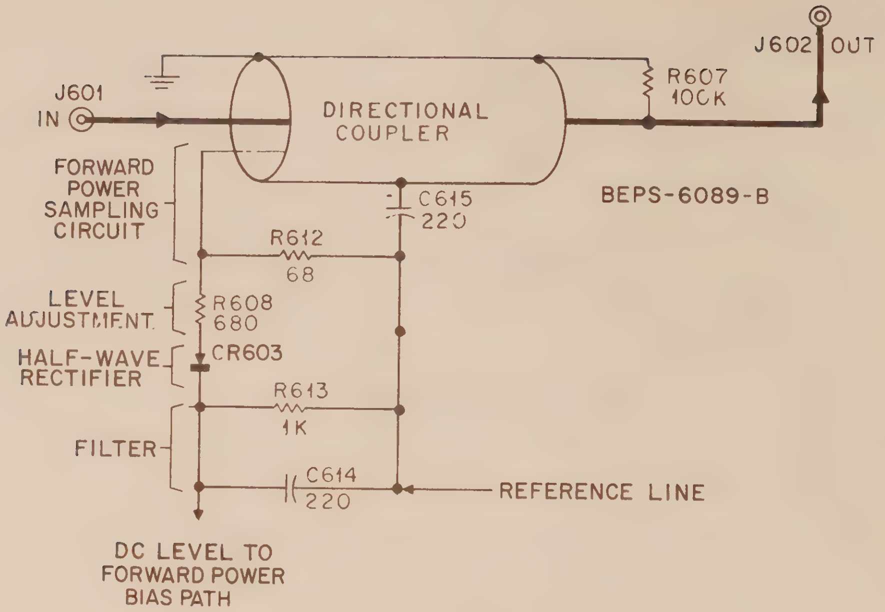

J601
IN
DIRECTIONAL COUPLER
J602
OUT
R607
100K
BEPS-6089-B
FORWARD POWER SAMPLING CIRCUIT
C615
220
R612
68
LEVEL ADJUSTMENT
R608
680
HALF-WAVE RECTIFIER
CR603
R613
1K
FILTER
C614
220
REFERENCE LINE
DC LEVEL TO FORWARD POWER BIAS PATH

Figure 7.
Forward Power Detector Circuit

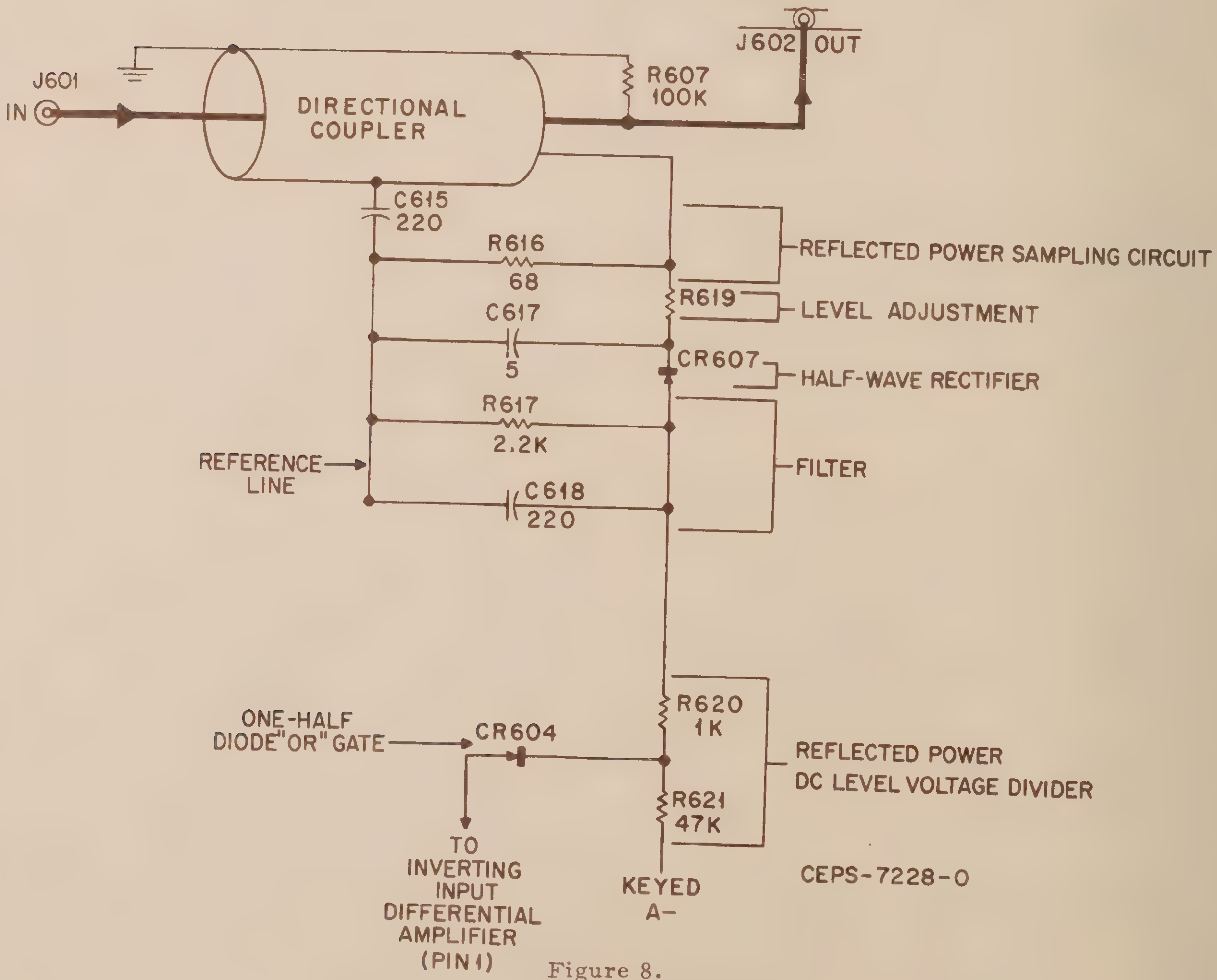

J601
IN
DIRECTIONAL COUPLER
J602
OUT
R607
100K
C615
220
R616
68
REFLECTED POWER SAMPLING CIRCUIT
R619
LEVEL ADJUSTMENT
C617
5
CR607
HALF-WAVE RECTIFIER
R617
2.2K
REFERENCE LINE
C618
220
FILTER
ONE-HALF DIODE "OR" GATE
CR604
R620
1K
R621
47K
REFLECTED POWER DC LEVEL VOLTAGE DIVIDER
TO INVERTING INPUT DIFFERENTIAL AMPLIFIER (PIN 1)
KEYED A−
CEPS-7228-0

Figure 8.
Reverse Power Detector Circuit

input of the differential amplifier from the secondary divider circuitry.

(2) VSWR - Reverse Power Detection Circuit

Since the power control board is now operating correctly with the proper amount of forward power and the correct biases, the detection of reflected power causes a decrease in the power amplifier's output in the following manner.

Refer to Figure 8. The components of the reverse power detector circuit function the same as those in the forward power detector. The voltage divider develops a bias voltage that isn't quite enough to forward bias the diode that makes up one-half of a diode "OR" gate. When reflected power is detected, the resultant negative-going dc level lowers the dc bias level and the combination of the two forward bias the diode. The negative-going dc level on the inverting input increases the output voltage of the differential amplifier, decreasing the dc control output to protect the final stages of the power amplifier.

(3) Temperature Protection Circuit

Refer to Figure 9. When the heat sink temperature rises above approximately 80°C, the thermistor in parallel with the lower half of the VSWR voltage divider reaches a value of resistance which allows a more negative potential to be applied through the diode "OR" gate to the inverting input of the differential amplifier. The temperature protection decreases the level of the reference and therefore the power output of the power amplifier board.

Thermistor RT601 is omitted on continuous duty stations. Temperature protection is not needed due to the large exchanger used.

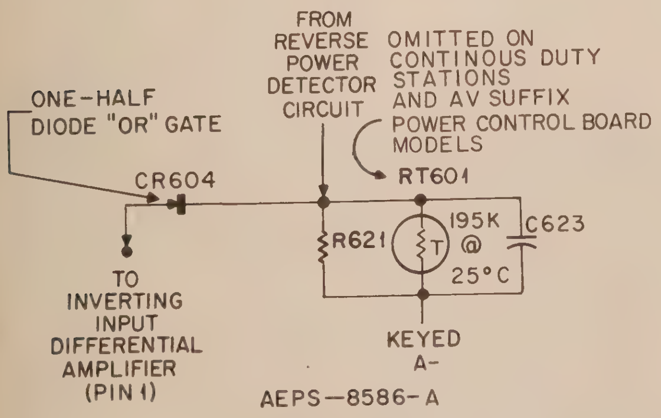


Figure 9.
Temperature Protection Circuit

(4) DC Level Output Amplification

The output of the differential amplifier is applied to the base of a voltage-inverting transistor amplifier whose output supplies the output control current. As the forward power increases above the normal value, the output of the differential amplifier increases proportionally. Since the dc level is increasing the base, the P-N-P transistor conducts less and the potentials across the output load resistor, and on the control output line, decrease.

4. MAINTENANCE

CAUTION

The power control board is incorporated in the transmitter to provide protection for the rf power transistors under environmental conditions such as voltage, temperature, load variation, and device variations. In order for the circuitry to operate properly and provide protection it is necessary to set the power output control (POWER SET) in accordance with the station alignment procedure.

a. General

Two basic maintenance approaches may be used for localizing and replacing trouble in these radio sets.

- Replace the defective circuit board with a spare and return the defective board to a maintenance shop for repair.

If necessary, a power control board from a "Micor" mobile radio may be used as a replacement. In continuous duty stations, remove thermistor RT601 before installing the board.

CAUTION

If the power control board is removed from a continuous duty station, be sure Thermistor RT601 is replaced before using the board in a mobile radio or intermittent duty station.

- Isolate and repair the trouble on the spot. This approach must be used if spares are not available.

Regardless of the maintenance approach used, a few simple tests on the overall radio set will localize the trouble to the power control board if it is defective. These procedures are given elsewhere in the manual. This section of the manual provides the maintenance shop level procedures for the power control circuitry. It assumes that preliminary tests have already localized the trouble to the power control board. These bench test type procedures include measurements with a Motorola portable test set, a simple set of performance tests, and complete troubleshooting procedures including step-by-step circuit check-out.

NOTE

The power control board must be installed in the station for testing to provide the necessary power, ground, control, and signal connections. For bench testing of a board that has been removed from the station and replaced by a spare, another station or Motorola "Micor"® mobile FM two-way radio is required as a test fixture for troubleshooting.

b. Recommended Test Equipment

The following test equipment is the minimum required for troubleshooting and adjusting the board. All such equipment is battery operated. When ac operated equipment is used, the ground lead must not be electrically connected to ac line ground.

(1) Optional built-in station metering or Motorola S1056B through S1059B Portable Test Set and Model TEK-37 or TEK-37A Adapter Cable. (The meter or portable test set is necessary to monitor forward and reverse power detectors.)

(2) Motorola Solid-State DC Multimeter or equivalent. A 20,000 ohm-per-volt multimeter may be used but a low impedance volt-ohm meter may not be used. This meter is used for measuring dc voltages and resistance.

(3) Motorola T1013A RF Load Resistor (Dummy Load) or equivalent.

c. Metering

The power control board is equipped with a metering receptacle which allows three major test points (forward power, reflected power and control current) to be measured. Refer to the troubleshooting charts or the schematic diagram for the correct meter indications.

When optional built-in station metering is used in continuous duty stations, only exciter output (PA input), final PA current, and final PA voltage may be checked. Refer to the alignment procedure for selector switch position functions.

(1) Using Built-In Station Metering

(a) The output of the power control board must be terminated in one of three types of loads.

--The antenna load

--A dummy load such as Motorola's T1013A RF Load Resistor.

--An RF wattmeter.

NOTE

A dummy load is preferred to the antenna to eliminate the possibility of shutback due to a defective antenna.

(b) Turn the station ON.

(c) Set the selector switch of the built-in station meter to position 1 and key the transmitter. Observe the wattmeter, or the meter reading if a dummy load is used or if the antenna is used. Unkey the transmitter. Under normal conditions at rated power out, meter 1 should read between 22 uA and 40 uA typically.

(2) Using Portable Test Set

(a) Set the function selector switch of the portable test set to the XMTR position.

(b) Set the meter reversing switch of the test set to the METER REV position.

(c) Set the REF switch to position A or B.

(d) Connect the 20-pin meter cable plug to the test set. When the test set is not in use, disconnect the 20-pin plug to conserve battery life. The plug acts as an on-off switch completing the battery circuit.

(e) Connect the red "control" plug of the adapter cable to the control receptacle on the local or remote control circuit board. Connect the white "metering" plug of the adapter cable to the receptacle on the power control board.

(f) The output of the power control board must be terminated in one of three types of loads.

--The antenna load.

--A dummy load such as Motorola's T1013A RF Load Resistor.

--An RF wattmeter.

NOTE

A dummy load is preferred to the antenna to eliminate the possibility of shutback due to a defective antenna.

(g) Turn the station ON.

(h) Set the selector switch of the test set to position 1 and key the transmitter with the XMTR ON button on the test set. Observe the wattmeter, or the meter reading if a dummy load is used or if the antenna is used. Unkey the transmitter. Under normal conditions at rated power out, meter 1 should read between 22 uA and 40 uA typically.

d. Performance Test, Power Set Control

This control allows the power output of the radio set to be varied from zero (0) power out with the control fully counterclockwise to greater than the rated output.

CAUTION

For proper operation of the protection circuitry, it is imperative that the POWER SET control never be left in a position that exceeds rated power output.

Refer to the power amplifier tune-up procedure.

(a) Key the transmitter.

(b) Adjust the POWER SET control until the rated power output is reached.

(c) Unkey the transmitter.

e. Troubleshooting

(1) Isolating Defective Components

If built-in station meter or test set readings are abnormal or tests indicate subnormal performance, a logical troubleshooting procedure is required to isolate the defective component efficiently. The accompanying troubleshooting charts summarize these results in a logical sequence. A few voltage and resistance checks in the suspected circuit should readily isolate the defective component. Note that all circuits powered by A+ and A- are not referenced to chassis ground, but to A-. This feature allows operation from positive or negative ground power sources.

(2) Troubleshooting Integrated Circuits

Integrated circuits (IC's) are very reliable components and should not be replaced until all checks have proven definitely that the IC is the defective component. Removal of an IC is time consuming and often ruins the part. Therefore, a few extra checks before that task is attempted are worthwhile. Before replacing a bad IC, make sure that the external components in the circuit are normal. Otherwise, the conditions which caused the IC to fail initially may still be present and destroy the new IC.

A defective IC on the power control board may be located by dc voltage measurements. Measure the dc voltages at the pins of the IC, as shown in the troubleshooting charts. Refer to the troubleshooting charts or the IC601 Schematic Diagram (Figure 3.), to locate and isolate any defective component on the board.

If the IC is to be replaced, use a "desoldering" iron with a vacuum bulb to remove solder.

f. Troubleshooting Notes

The schematic diagram of the power control board contains the voltages necessary for troubleshooting. These voltages are typical for normal operating conditions at rated power out for the station. Refer to the troubleshooting charts and the schematic when troubleshooting and a defect is suspected on the power control board.

NOTES

(1) Slight variations in meter readings or power out may occur during measurements. This is normal and does not necessarily indicate any problem.

(2) With 0 reflected power (1:1 VSWR), meter 2 will read between -10 uA and -18 uA on Model TLD8610A, and between -3 uA and -8 uA on Model TLD8620A. Again, this is normal and does not indicate a defect. The meter reversing switch on the portable test set must be placed in the OFF position for upscale readings of meter 2. Built-in station metering polarity switch mube be set to FWD when metering the power control board.

g. Complete Power Amplifier Alignment

A complete realignment of the power amplifier tuning controls and power control board adjustments may be necessary under the following conditions:

(1) Major changes, repairs (such as transistor replacement) or complete replacement of the power amplifier board.

(2) Repair or replacement of the power control board.

(3) A change in transmitter frequency greater than approximately ±1 MHz.

A complete alignment procedure is at the end of this section.

IMPORTANT

The complete alignment procedure differs from the standard tune-up procedure in that a factory set control which has been adjusted for full power amplifier protection under tune-up conditions must be readjusted. This complete alignment procedure is not required and should not be performed when an alignment check is required or if frequency has been changed less than ±1 MHz.

COMPLETE PO
ALIGNMENT

NO

If the transmitter frequency i
the exciter board per the exc

STEP	ADJUST	METERING PLUG LOCATION	SELECTO SWITCH POSITIO
1			
2	C501 C502 R610		
3	POWER SET	POWER CONTROL BOARD	
4	C501	POWER CONTROL BOARD	5

CEDURE (CONT'D)

R	OSC & METER REV SWITCH POSITION (SEE NOTE)	STAGE AND PROCEDURE
	METER REV. REF B	FINAL COLLECTOR VOLTAGE - Measure the final collector voltage (V_c). V_c is the meter 6 reading (0-30 V scale).
		Determine the final input power (P_{in}). P_{in} equals $V_c \times I_c$. P_{in} should be less than: 120 W for 60 W models 180 W for 90 W models 200 W for 100 W and 110 W models

BOARD METERING

TE

d power into proper 50 ohm load.

ORMAL TER READINGS	FUNCTION
22-45 uA	Indicates forward power output per calibration label on PA shield.
uA (60 W models) 18 uA (90/100/ W models)	A meter reading higher than the normal range indicates reflected power caused by a defective antenna, antenna switch, or cables.
3-35 uA	Indicates the relative level of drive sent to the PA on the blue control lead. A reading of greater than 35 uA indicates the power control board is set for a higher power than the radio is capable of supplying.

NG NOTE

g a Motorola S1056B thru S1059B
t-in station metering. The OSC.
refers to portable test set usage.
ring is similar to the portable
sured with the two voltage probes.
itch is set to REV for PA metering
d metering.

g. Complete Power Amplifier Alignment

A complete realignment of the power amplifier tuning controls and power control board adjustments may be necessary under the following conditions:

(1) Major changes, repairs (such as transistor replacement) or complete replacement of the power amplifier board.

(2) Repair or replacement of the power control board.

(3) A change in transmitter frequency greater than approximately ±1 MHz.

A complete alignment procedure is at the end of this section.

IMPORTANT

The complete alignment procedure differs from the standard tune-up procedure in that a factory set control which has been adjusted for full power amplifier protection under tune-up conditions must be readjusted. This complete alignment procedure is not required and should not be performed when an alignment check is required or if frequency has been changed less than ±1 MHz.

COMPLETE POWER AMPLIFIER ALIGNMENT PROCEDURE

NOTE
If the transmitter frequency is to be changed, first realign the exciter board per the exciter alignment procedure.

STEP	ADJUST	METERING PLUG LOCATION	SELECTOR SWITCH POSITION	OSC & METER REV. SWITCH POSITION (SEE NOTE)	STAGE AND PROCEDURE
1					If the power amplifier is to be re-aligned greater than ±1 MHz from the original frequency, proceed with step 2. If the power amplifier is to be re-aligned less than ±1 MHz from the original frequency, remove the power control board shield, move the metering plug to the power control board and proceed to step 6.
2	C501 C502 R610				PRE-ALIGNMENT - Set capacitor C501 fully clockwise. For 90-, 100-, and 110-watt radio sets, also set capacitor C502 to maximum capacity (plates fully meshed). Remove the power control board shield and move the metering plug to the power control board. Use tuning tool #66A82846D01, or equivalent, to pre-align R610 located on the component side of the board. Access to this control is provided by a small slot located approximately 3/4-inch from the POWER SET access hole. The tuning tool is used to rotate the outer edge of a serrated knob. Adjust the POWER LIMIT control to the end of its travel by rotating the edge of the knob toward the bottom of the station.
3	POWER SET	POWER CONTROL BOARD			TRANSMITTER OUTPUT - Adjust the POWER SET control to the maximum clockwise position.
4	C501	POWER CONTROL BOARD	5	METER REV REF B	PA DRIVER OUTPUT - Observe meter 5. If this indication is LESS than 50 uA (full scale), proceed with step 5. If this indication is GREATER than 50 uA, tune C501 for an on-scale reading.

ALIGNMENT PROCEDURE (CONT'D)

STEP	ADJUST	METERING PLUG LOCATION	SELECTOR SWITCH POSITION	OSC & METER REV SWITCH POSITION (SEE NOTE)	STAGE AND PROCEDURE
5	R610	POWER CONTROL BOARD	Wattmeter or 1	METER REV REF A	TRANSMITTER OUTPUT - Adjust R610 toward the top of the station until either rated output is attained or no further increase in power output is observed. In either case, adjust the POWER LIMIT control for an approximate 5- to 10-watt reduction.
6	C501 C502	POWER CONTROL BOARD	5	METER REV REF B	PA DRIVER OUTPUT - Tune C501 for a minimum meter 5 reading. If a dip is not present, minimum meter 5 should occur at maximum capacitance. On 90/100/110-watt models tune C501, then C502 for a minimum meter 5 reading.
7	R610	POWER CONTROL BOARD	Wattmeter or 1	METER REV REF A	TRANSMITTER OUTPUT - Adjust R610 for the following power output: 60-watt models approximately 65 W, 90/100/110-watt models approximately 115 W. Repeat step 6. NOTE: If the required output cannot be obtained, repeat steps 5 and 6.
8	R610	POWER CONTROL BOARD	5	METER REV REF B	Replace the power control board shield. If meter 5 exceeds 50 uA when the shield is replaced, remove the shield and adjust R610 slightly (turn knob toward the bottom of the station) until an on-scale reading--50 uA or less--is obtained with the shield replaced. The power output should be at least that specified in step 7.
9	POWER SET	POWER CONTROL BOARD	Wattmeter or 1	METER REV REF A	TRANSMITTER OUTPUT - Adjust the POWER SET control for rated power out and repeat step 6.
10		PA	5	METER REV REF B	FINAL COLLECTOR CURRENT - Move the metering plug to the PA. Measure the final collector current (I_C). I_C, in amperes, is the meter 5 reading, (0-50) x 1/5 for 60-watt models; meter 5 reading (0-50) x 1/2 for 90/100/110-watt models.

ALIGNMENT PROCEDURE (CONT'D)

STEP	ADJUST	METERING PLUG LOCATION	SELECTOR SWITCH POSITION	OSC & METER REV SWITCH POSITION (SEE NOTE)	STAGE AND PROCEDURE
11		PA	6	METER REV. REF B	FINAL COLLECTOR VOLTAGE - Measure the final collector voltage (V_c). V_c is the meter 6 reading (0-30 V scale).
12					Determine the final input power (P_{in}). P_{in} equals $V_c \times I_c$. P_{in} should be less than: 120 W for 60 W models 180 W for 90 W models 200 W for 100 W and 110 W models

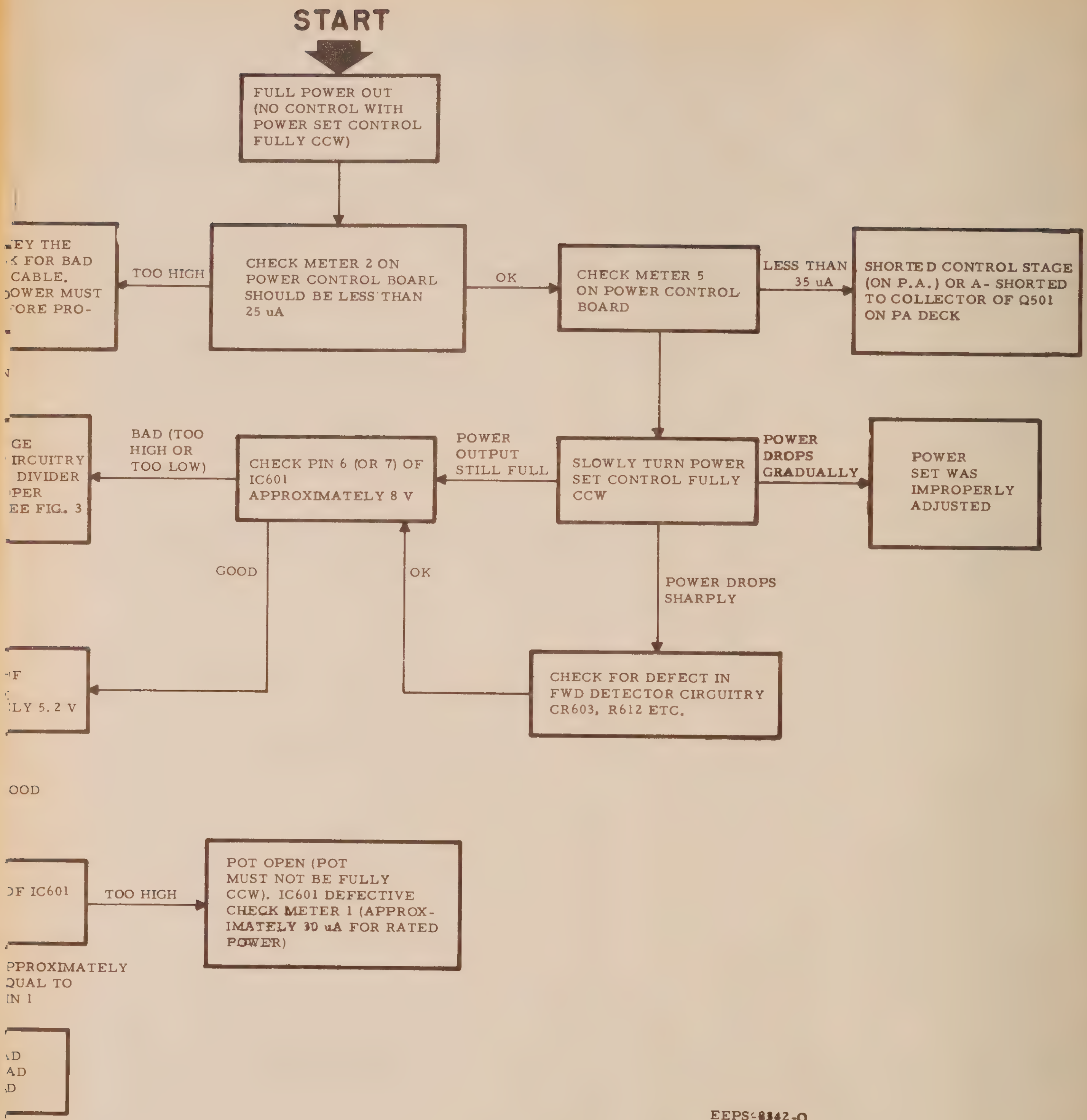
POWER CONTROL BOARD METERING

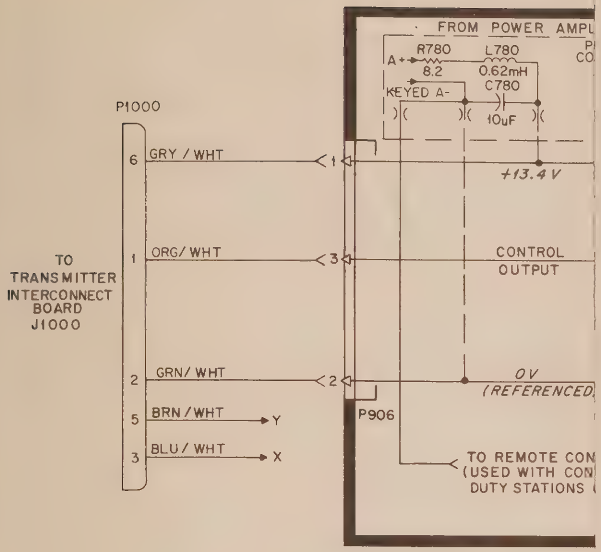
NOTE
Radio operating at rated power into proper 50 ohm load.

SELECTOR SWITCH POSITION	REFERENCE SWITCH POSITION (SEE NOTE)	NORMAL METER READINGS	FUNCTION
1	A (Meter Reverse On)	22-45 uA	Indicates forward power output per calibration label on PA shield.
2	A	3-8 uA (60 W models) 10-18 uA (90/100/110 W models)	A meter reading higher than the normal range indicates reflected power caused by a defective antenna, antenna switch, or cables.
5	B (Meter Reverse On)	3-35 uA	Indicates the relative level of drive sent to the PA on the blue control lead. A reading of greater than 35 uA indicates the power control board is set for a higher power than the radio is capable of supplying.

METERING NOTE

Alignment may be performed using a Motorola S1056B thru S1059B Portable Test Set or optional built-in station metering. The OSC. & METER REV. SWITCH column refers to portable test set usage. The optional built-in station metering is similar to the portable test set except PA voltage is measured with the two voltage probes. The built-in metering polarity switch is set to REV for PA metering and FWD for Power Control Board metering.


START
FULL POWER OUT (NO CONTROL WITH POWER SET CONTROL FULLY CCW)
CHECK METER 2 ON POWER CONTROL BOARD SHOULD BE LESS THAN 25 uA
TOO HIGH
EY THE
K FOR BAD
CABLE.
OWER MUST
ORE PRO-
N
OK
CHECK METER 5 ON POWER CONTROL BOARD
LESS THAN 35 uA
SHORTED CONTROL STAGE (ON P.A.) OR A- SHORTED TO COLLECTOR OF Q501 ON PA DECK
SLOWLY TURN POWER SET CONTROL FULLY CCW
POWER DROPS GRADUALLY
POWER SET WAS IMPROPERLY ADJUSTED
POWER OUTPUT STILL FULL
CHECK PIN 6 (OR 7) OF IC601 APPROXIMATELY 8 V
BAD (TOO HIGH OR TOO LOW)
GE
IRCUITRY
DIVIDER
PER
EE FIG. 3
GOOD
OK
POWER DROPS SHARPLY
CHECK FOR DEFECT IN FWD DETECTOR CIRCUITRY CR603, R612 ETC.
F
LY 5.2 V
OOD
F IC601
TOO HIGH
POT OPEN (POT MUST NOT BE FULLY CCW). IC601 DEFECTIVE CHECK METER 1 (APPROXIMATELY 30 uA FOR RATED POWER)
PPROXIMATELY
QUAL TO
N 1
D
AD
D


P1000
6
GRY / WHT
1
ORG/ WHT
2
GRN/ WHT
5
BRN / WHT
Y
3
BLU / WHT
X
TO
TRANSMITTER
INTERCONNECT
BOARD
J1000
FROM POWER AMPL
R780
8.2
L780
0.62mH
C780
10uF
A+
KEYED A-
+13.4 V
CONTROL
OUTPUT
0V
(REFERENCED)
P906
TO REMOTE CON
(USED WITH CON
DUTY STATIONS

POWER CONTROL BOARD

601. VOLTAGES AT PINS 1 AND 5 SHOULD DIFFER BY LESS THAN 50 mV.
602. VOLTAGES MEASURED AT 25 C.
603.

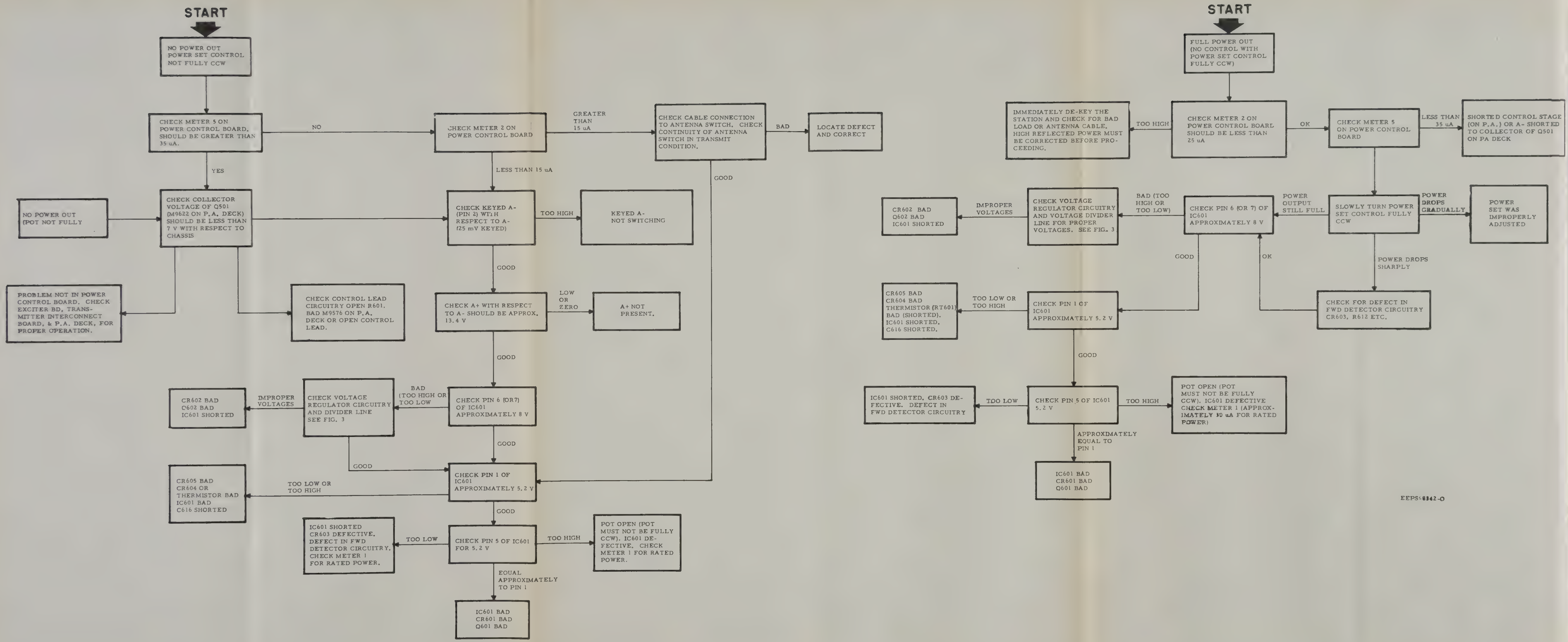
POWER	R606	R622	R617
60 W	15K	18K	1.8K
90/100/110 W	27K	47K	2.2K

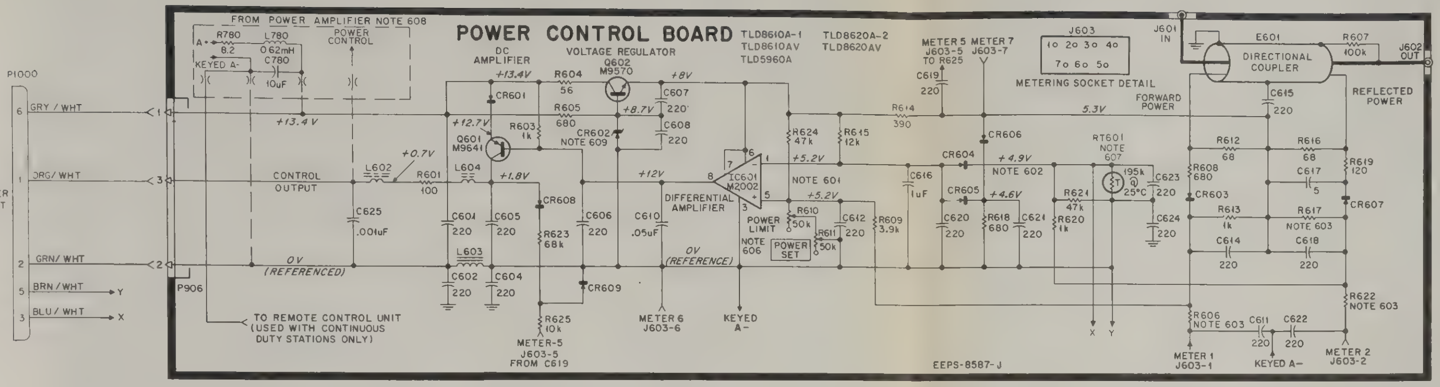
604. TYPICAL VOLTAGES UNDER NORMAL OPERATING CONDITIONS.
605. UNLESS OTHERWISE STATED: CAPACITOR VALUES ARE IN PICOFARADS.
606. FACTORY ADJUSTMENT.
607. RT601 OMITTED IN CONTINUOUS DUTY STATIONS AND FOR MODELS TLD8610AV & TLD8620AV.
608. USED ONLY IN CONTINUOUS DUTY STATIONS. NOT PART OF OR MOUNTED ON POWER CONTROL BOARD. PART OF MODEL TLN4780A P.A. HEAT SINK KIT.
609. ON MODEL TLD5960A CR602 IS A HYBRID ASSEMBLY.

EPS-8313-E

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

TLD8610A-1 and TLD8620A-1
TLD8610AV and TLD8620AV
Power Control Board
Schematic Diagram & Circuit Board Detail
Motorola No. 63P81015E08-K
12/5/78-UP


START
NO POWER OUT POWER SET CONTROL NOT FULLY CCW
CHECK METER 5 ON POWER CONTROL BOARD. SHOULD BE GREATER THAN 35 uA.
NO
YES
CHECK METER 2 ON POWER CONTROL BOARD
GREATER THAN 15 uA
CHECK CABLE CONNECTION TO ANTENNA SWITCH. CHECK CONTINUITY OF ANTENNA SWITCH IN TRANSMIT CONDITION.
BAD
LOCATE DEFECT AND CORRECT
GOOD
LESS THAN 15 uA
NO POWER OUT (POT NOT FULLY
CHECK COLLECTOR VOLTAGE OF Q501 (M9622 ON P.A. DECK) SHOULD BE LESS THAN 7 V WITH RESPECT TO CHASSIS
CHECK KEYED A- (PIN 2) WITH RESPECT TO A- (25 mV KEYED)
TOO HIGH
KEYED A- NOT SWITCHING
GOOD
PROBLEM NOT IN POWER CONTROL BOARD. CHECK EXCITER BD, TRANSMITTER INTERCONNECT BOARD, & P.A. DECK, FOR PROPER OPERATION.
CHECK CONTROL LEAD CIRCUITRY OPEN R601. BAD M9576 ON P.A. DECK OR OPEN CONTROL LEAD.
CHECK A+ WITH RESPECT TO A- SHOULD BE APPROX. 13.4 V
LOW OR ZERO
A+ NOT PRESENT.
GOOD
CR602 BAD Q602 BAD IC601 SHORTED
IMPROPER VOLTAGES
CHECK VOLTAGE REGULATOR CIRCUITRY AND DIVIDER LINE SEE FIG. 3
BAD (TOO HIGH OR TOO LOW
CHECK PIN 6 (OR7) OF IC601 APPROXIMATELY 8 V
GOOD
GOOD
CR605 BAD CR604 OR THERMISTOR BAD IC601 BAD C616 SHORTED
TOO LOW OR TOO HIGH
CHECK PIN 1 OF IC601 APPROXIMATELY 5.2 V
GOOD
IC601 SHORTED CR603 DEFECTIVE. DEFECT IN FWD DETECTOR CIRCUITRY. CHECK METER 1 FOR RATED POWER.
TOO LOW
CHECK PIN 5 OF IC601 FOR 5.2 V
TOO HIGH
POT OPEN (POT MUST NOT BE FULLY CCW). IC601 DEFECTIVE. CHECK METER 1 FOR RATED POWER.
EQUAL APPROXIMATELY TO PIN 1
IC601 BAD CR601 BAD Q601 BAD
START
FULL POWER OUT (NO CONTROL WITH POWER SET CONTROL FULLY CCW)
IMMEDIATELY DE-KEY THE STATION AND CHECK FOR BAD LOAD OR ANTENNA CABLE. HIGH REFLECTED POWER MUST BE CORRECTED BEFORE PROCEEDING.
TOO HIGH
CHECK METER 2 ON POWER CONTROL BOARD SHOULD BE LESS THAN 25 uA
OK
CHECK METER 5 ON POWER CONTROL BOARD
LESS THAN 35 uA
SHORTED CONTROL STAGE (ON P.A.) OR A- SHORTED TO COLLECTOR OF Q501 ON PA DECK
CR602 BAD Q602 BAD IC601 SHORTED
IMPROPER VOLTAGES
CHECK VOLTAGE REGULATOR CIRCUITRY AND VOLTAGE DIVIDER LINE FOR PROPER VOLTAGES. SEE FIG. 3
BAD (TOO HIGH OR TOO LOW)
CHECK PIN 6 (OR 7) OF IC601 APPROXIMATELY 8 V
POWER OUTPUT STILL FULL
SLOWLY TURN POWER SET CONTROL FULLY CCW
POWER DROPS GRADUALLY
POWER SET WAS IMPROPERLY ADJUSTED
GOOD
OK
POWER DROPS SHARPLY
CR605 BAD CR604 BAD THERMISTOR (RT601) BAD (SHORTED). IC601 SHORTED. C616 SHORTED.
TOO LOW OR TOO HIGH
CHECK PIN 1 OF IC601 APPROXIMATELY 5.2 V
CHECK FOR DEFECT IN FWD DETECTOR CIRCUITRY CR603, R612 ETC.
GOOD
IC601 SHORTED. CR603 DEFECTIVE. DEFECT IN FWD DETECTOR CIRCUITRY
TOO LOW
CHECK PIN 5 OF IC601 5.2 V
TOO HIGH
POT OPEN (POT MUST NOT BE FULLY CCW). IC601 DEFECTIVE CHECK METER 1 (APPROXIMATELY 30 uA FOR RATED POWER)
APPROXIMATELY EQUAL TO PIN 1
IC601 BAD CR601 BAD Q601 BAD
EEPS-8342-O


POWER CONTROL BOARD
TLD8610A-1
TLD8610AV
TLD5960A
TLD8620A-2
TLD8620AV
FROM POWER AMPLIFIER NOTE 608
R780 8.2
L780 0.62mH
C780 10uF
KEYED A-
POWER CONTROL
P1000
GRY / WHT
ORG / WHT
GRN / WHT
BRN / WHT
BLU / WHT
TO TRANSMITTER INTERCONNECT BOARD J1000
P906
+13.4V
CONTROL OUTPUT
0V (REFERENCED)
TO REMOTE CONTROL UNIT (USED WITH CONTINUOUS DUTY STATIONS ONLY)
DC AMPLIFIER
VOLTAGE REGULATOR
Q602 M9570
Q601 M9641
+13.4V
+12.7V
+8V
+8.7V
+0.7V
+1.8V
+12V
R604 56
R605 680
R603 1k
CR601
CR602 NOTE 609
C607 220
C608 220
L602
R601 100
C625 .001uF
L604
L603
C601 220
C605 220
C602 220
C604 220
CR608
R623 68k
C606 220
CR609
C610 .05uF
R625 10k
METER-5 J603-5 FROM C619
METER 6 J603-6
KEYED A-
DIFFERENTIAL AMPLIFIER
IC601 M2002
0V (REFERENCE)
POWER LIMIT NOTE 606
POWER SET
R610 50k
R611 50k
R624 47k
R615 12k
+5.2V
NOTE 601
+5.2V
C612 220
R609 3.9k
METER 5 J603-5 TO R625
METER 7 J603-7
C619 220
R614 390
J603
10 20 30 40
70 60 50
METERING SOCKET DETAIL
CR606
CR604
+4.9V NOTE 602
C616 1uF
CR605
+4.6V
C620 220
R618 680
C621 220
R621 47k
R620 1k
RT601 NOTE 607
195k @ 25°C
C623 220
C624 220
5.3V
FORWARD POWER
J601 IN
E601 DIRECTIONAL COUPLER
R607 100k
J602 OUT
C615 220
REFLECTED POWER
R612 68
R616 68
R608 680
C617 5
R619 120
CR603
CR607
R613 1k
R617 NOTE 603
C614 220
C618 220
R622 NOTE 603
R606 NOTE 603
C611 220
C622 220
METER 1 J603-1
KEYED A-
METER 2 J603-2
X
Y
EEPS-8587-J

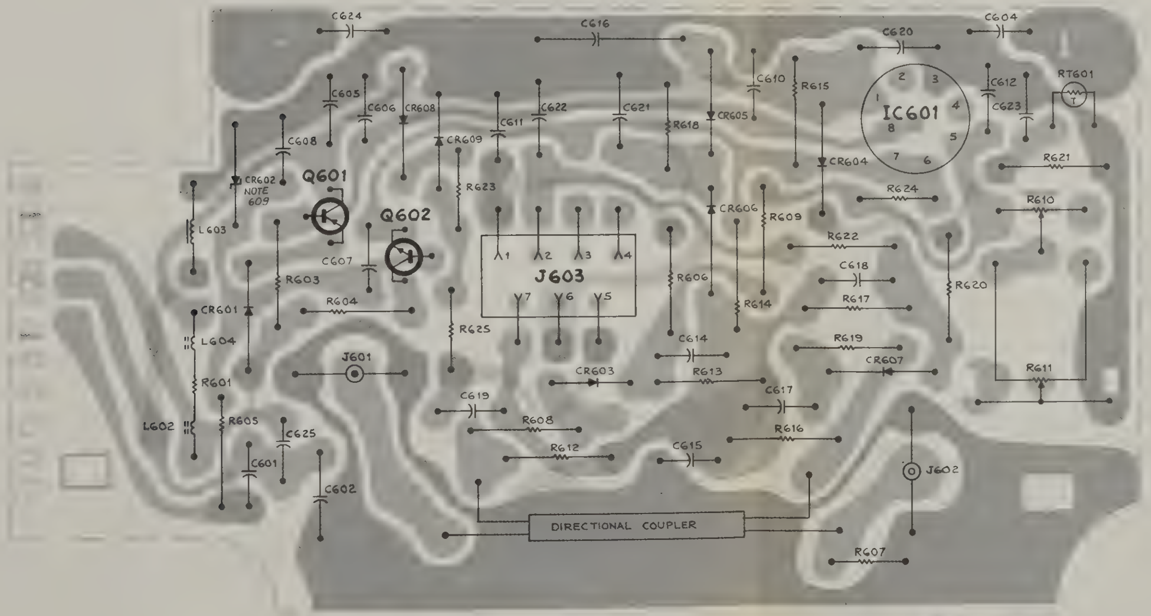
POWER CONTROL BOARD

601. VOLTAGES AT PINS 1 AND 5 SHOULD DIFFER BY LESS THAN 50 mV.
602. VOLTAGES MEASURED AT 25 C.
603.

POWER	R606	R622	R617
60 W	15K	15K	1.[illegible]K
90/100/110 W	27K	47K	2.2K

604. TYPICAL VOLTAGES UNDER NORMAL OPERATING CONDITIONS.
605. UNLESS OTHERWISE STATED: CAPACITOR VALUES ARE IN PICOFARADS.
606. FACTORY ADJUSTMENT.
607. RT601 OMITTED IN CONTINUOUS DUTY STATIONS AND FOR MODELS TLD8610AV & TLD8620AV.
608. USED ONLY IN CONTINUOUS DUTY STATIONS. NOT PART OF OR MOUNTED ON POWER CONTROL BOARD. PART OF MODEL TLN4780A P.A. HEAT SINK KIT.
609. ON MODEL TLD5960A CR602 IS A HYBRID ASSEMBLY.

EPS-8313-E


C624
C616
C620
C604
C605
C606
CR608
C608
CR609
C611
C622
C621
R618
CR605
C610
R615
IC601
C612
C623
RT601
Q601
Q602
CR602 NOTE 609
L603
C607
R623
J603
CR606
R609
CR604
R624
R621
R610
R622
C618
R617
R620
R603
R604
CR601
L604
R625
R606
R614
C614
R613
R619
CR607
R611
J601
CR603
C619
R608
C617
R601
R605
C625
L602
C601
C602
R612
C615
R616
J602
DIRECTIONAL COUPLER
R607

COMPONENT SIDE
SOLDER SIDE
BD-CEPS-16812-C
OL-CEPS-16813-C

SHOWN FROM SOLDER SIDE

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM
TLD8610A-1 and TLD8620A-1
TLD8610AV and TLD8620AV
Power Control Board
Schematic Diagram & Circuit Board Detail
Motorola No. 63P81015E08-K
12/5/78-UP

ICAL PARTS LIST

Power Control Board (High Power)
AV Power Control Board (Low Power)
AV Power Control Board (High Power) PL-1508-F

NOTE

list covers more than one model. Where differences odel number of the applicable unit is given in the n column.

		CAPACITOR, fixed:
	21-83596E10	220 pF ±20%; 500 V
	21-83596E10	220 pF ±20%; 500 V
08	21-83596E10	220 pF ±20%; 500 V
	21-82372C04	.05 uF +80-20%; 25 V
	21-83596E10	220 pF ±20%; 500 V
	21-83596E10	220 pF ±20%; 500 V
	23-83214C04	1.0 uF ±20%; 15 V
	21-82133G53	5 pF ±0.5 pF; 500 V; NP0
24	21-83596E10	220 pF ±20%; 500 V
	21-82187E14	.001 uF ±10%; 100 V
		SEMICONDUCTOR DEVICE, diode:
	48-83654H01	silicon
	48-83696E04	Zener (9.1 V)
	or 1-80709D68	hybrid assembly
	48-84616A01	silicon
	48-82392B18	silicon
	48-82392B18	silicon
	48-82392B18	silicon
	48-84616A01	silicon
	48-82392B03	silicon
	48-82392B18	silicon
		COUPLER, line:
	58-84685B01	dual
		INTEGRATED CIRCUIT:
	51-84320A02	M2002
		CONNECTOR, receptacle:
	28-84227B02	male; single contact
	9-84231B02	female; single contact
	9-84207B01	female; 7 contact
		COIL, RF:
	76-83960B01	ferrite bead
	24-83961B01	choke
	76-83960B01	ferrite bead
		CONNECTOR, plug:
	—	consists of: (TLD8610AV & TLD8620AV only)
	15-83498F06	HOUSING, connector
	29-83499F01	CONTACT, terminal: 5 used
	46-84549F01	PLUG, polarizing
		TRANSISTOR:
	48-869641	PNP; type M9641
	48-869570	NPN; type M9570
		RESISTOR, fixed: ±10%; 1/4 W: unless otherwise stated
	17-82291B21	100 ±5%; 3 W
	6-124C49	1k
	6-124C19	56
	6-124A45	680 ±5%
	6-124A77	15k ±5% (TLD8610A only)
	or6-124A83	27k ±5% (TLD8620A, TLD5960A)
	6-124C97	100k
	6-124A45	680 ±5%
	6-124A63	3.9k ±5%
	18-83083G26	variable; 50k
	18-83083G20	variable; 50k
	6-124A21	68 ±5%
	6-124A49	1k ±5%
	6-124A39	390 ±5%
	6-124C75	12k
	6-124A21	68 ±5%
	6-124A57	2.2k ±5% (TLD8620A, TLD5960A)
	or6-124A55	1.8k ±5% (TLD8610A only)
	6-124A45	680 ±5%
	6-124A27	120 ±5%
	6-124C49	1k
	6-124A89	47k
	6-131526	18k ±5% (TLD8610A only)
	or6-124A89	47k ±5% (TLD8620A, TLD5960A)
	6-185A93	68k ±5%; 1/8 W
	6-185B99	47k; 1/8 W

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R625	6-185A73	10k ±5%; 1/8 W
		THERMISTOR:
RT601	6-82462G03	195k @25°C (TLD8610A & TLD8620A only)
	MECHANICAL PARTS	
	3-139506	SCREW, tapping 4-40 x 5/16"; 4 used
	42-84284B01	RETAINER; 4 used
	55-84300B04	HANDLE

Power Amplifier Heatsink Kit (P/O TLN4780A) PL-2657-A

		CAPACITOR, fixed:
C780	23-83214C20	10 uF ±20%; 20 V
		COIL, RF: choke;
L780	24-80900A61	0.62 mH; coded BRN-ORG
		RESISTOR, fixed:
R780	6-124B67	8.2 ±5%; 1/4 W

SIMPLEX "DIGITAL PRIVATE-LINE" ENCODER

MODEL TTN6003A

tations with Simplex "Digital Private-Line" Binary-Coded Squelch.

code word generator (located on "Digital Private-Line" Decoder Board) to the exciter,
w pass active filter for 23-bit binary code word.
delayed keyed A+ (180 millisecond transmitter turn-off delay.

"DIGITAL PRIVATE-LINE" ENCODER BOARD TROUBLESHOOTING CHART

	PROBABLE CAUSES	ACTION
l A+	1. No keyed A+ to encoder board (pin 2).	Check keyed A+ at pin 10 of P902 on exciter board
	2. Malfunction in delayed keyed A+ generation circuitry.	Check delayed turn-off switch, delay generator and keying switch operation on encoder board.
+ s than ger than nkeying.	Malfunction in delayed keyed A+ circuits.	Check C710. Then check delay generator circuit.
it code out r unkeyed.	1. No input to encoder board pin 6 from decoder board.	On decoder board, check U801-5 for code signal. Check for 6.0 V dc at U801-24. If 6.0 V dc is present, check 50 kHz clock for proper operation (U801-4). If clock is ok, replace U801.
	2. Faulty inverter (Q702)	Check inverter operation.
	3. Active filter malfunction	Check Q703, Q704 operation.
ff code) ard pin 10 unkeyed.	U801 code generator on decoder board is not switching.	On decoder board, ground U801-9. If code is still present at U801-5, check 50 kHz clock output (U801-4). If clock is ok, replace U801.
ot code) is l pin 10 when d.	U801 code generator on decoder board is not switching.	Apply +9.6 V at J805 on decoder board. If turn-off code is still present at U801-5, replace U801.
sound" aker of this	1. Code deviation is greater than ±1 kHz	Check for proper waveform amplitude at encoder board pin 10 (Xmit code out).
	2. Low pass active filter is not switching from 140 Hz to 85 Hz.	Replace Q705.
heard a radio transmitter.	1. No turn-off code is being transmitted.	Check the delayed keyed A+ duration (170-250 msec). Then check U801-5 on decoder board for presence of the turn-off code.
	2. Low pass active filter is always switched low (85 Hz).	Replace Q705.
in the led by this e is being	Wrong code is being transmitted.	Feed U801-5 from decoder board into a Motorola Model SLN6413A "Digital Private-Line" test set. Check for proper decode. If proper decode is not obtained. Check for an intermittent or bad code plug (TRN6005A) or resistor network (Z801) on the decoder board. Check U801-15 thru U801-23 for a proper octal code.

REVISIONS

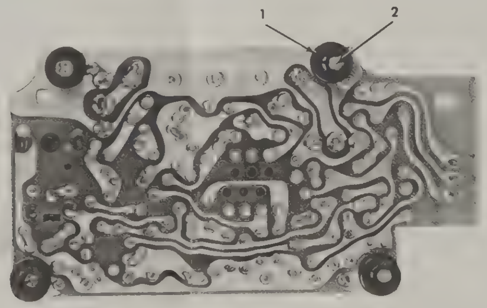
63P81015E08-K

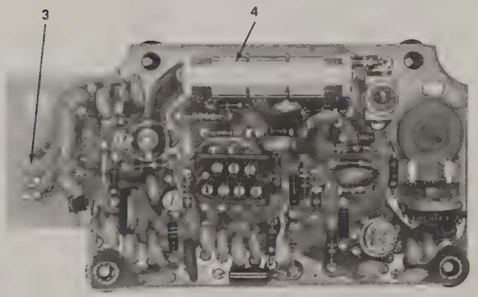
CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
TLN4780A-1	C780	ADDED 23-83214C20, 10 uF	P. A. INPUT (A+, A-)
	L780	ADDED 24-80900A61, 0.62 MH	
	R780	ADDED 6-124B67, 8.2 OHMS	
TLD8610A-1 TLD8620A-1	R619	FROM 6-124A13, 33 TO 6-124A27, 120	PARTS LIST
	R606	FROM 6-129887, 12K TO 6-124A77, 15K (TLD8610A ONLY)	
	R617	FROM 6-128689, 2.2K TO 6-124A55, 1.8K (TLD8610A ONLY)	
	RT601	FROM 6-867628 TO 6-82462G03 CIRCUIT BOARD PLATING REVISED	
TLD8610AV TLD8620AV		NEW MODELS ADDED	
TLD5960A		ADD NEW MODEL	

MECHANICAL PARTS LIST

PL-854-D

CODE	MOTOROLA PART NO.	DESCRIPTION
1	42C84284B01	RETAINER; 4 used
2	3-139506	SCREW, tapping; 4-40 x 5/16"
3	29C84028H01	TERMINAL, male; 3 used
4	42B84678B01	CLIP, component
	NON-CODED ITEM	
	55B84300B04	HANDLE, plastic
	1-80797B34	CABLE ASSEMBLY (TLD8610AV & TLD8620AV only) includes:
	42-10217A02	STRAP, tie





BEPS-6542-O

ELECTRICAL PARTS LIST

TLD5960A Power Control Board (High Power)
TLD8610A/AV Power Control Board (Low Power)
TLD8620A/AV Power Control Board (High Power) PL-1508-F

NOTE
This parts list covers more than one model. Where differences exist the model number of the applicable unit is given in the Description column.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C601	21-83596E10	220 pF ±20%; 500 V
C602	21-83596E10	220 pF ±20%; 500 V
C604 thru 608	21-83596E10	220 pF ±20%; 500 V
C610	21-82372C04	.05 uF +80-20%; 25 V
C611, 612	21-83596E10	220 pF ±20%; 500 V
C614, 615	21-83596E10	220 pF ±20%; 500 V
C616	23-83214C04	1.0 uF ±20%; 15 V
C617	21-82133G53	5 pF ±0.5 pF; 500 V; NP0
C618 thru 624	21-83596E10	220 pF ±20%; 500 V
C625	21-82187E14	.001 uF ±10%; 100 V
		SEMICONDUCTOR DEVICE, diode:
CR601	48-83654H01	silicon
CR602	48-83696E04	Zener (9.1 V)
	or 1-80709D68	hybrid assembly
CR603	48-84616A01	silicon
CR604	48-82392B18	silicon
CR605	48-82392B18	silicon
CR606	48-82392B18	silicon
CR607	48-84616A01	silicon
CR608	48-82392B03	silicon
CR609	48-82392B18	silicon
		COUPLER, line:
E601	58-84685B01	dual
		INTEGRATED CIRCUIT:
IC601	51-84320A02	M2002
		CONNECTOR, receptacle:
J601	28-84227B02	male; single contact
J602	9-84231B02	female; single contact
J603	9-84207B01	female; 7 contact
		COIL, RF:
L602	76-83960B01	ferrite bead
L603	24-83961B01	choke
L604	76-83960B01	ferrite bead
		CONNECTOR, plug:
P1000	—	consists of: (TLD8610AV & TLD8620AV only)
	15-83498F06	HOUSING, connector
	29-83499F01	CONTACT, terminal: 5 used
	46-84549F01	PLUG, polarizing
		TRANSISTOR:
Q601	48-869641	PNP; type M9641
Q602	48-869570	NPN; type M9570
		RESISTOR, fixed: ±10%; 1/4 W: unless otherwise stated
R601	17-82291B21	100 ±5%; 3 W
R603	6-124C49	1k
R604	6-124C19	56
R605	6-124A45	680 ±5%
R606	6-124A77	15k ±5% (TLD8610A only)
	or 6-124A83	27k ±5% (TLD8620A, TLD5960A)
R607	6-124C97	100k
R608	6-124A45	680 ±5%
R609	6-124A63	3.9k ±5%
R610	18-83083G26	variable; 50k
R611	18-83083G20	variable; 50k
R612	6-124A21	68 ±5%
R613	6-124A49	1k ±5%
R614	6-124A39	390 ±5%
R615	6-124C75	12k
R616	6-124A21	68 ±5%
R617	6-124A57	2.2k ±5% (TLD8620A, TLD5960A)
	or 6-124A55	1.8k ±5% (TLD8610A only)
R618	6-124A45	680 ±5%
R619	6-124A27	120 ±5%
R620	6-124C49	1k
R621	6-124A89	47k
R622	6-131526	18k ±5% (TLD8610A only)
	or 6-124A89	47k ±5% (TLD8620A, TLD5960A)
R623	6-185A93	68k ±5%; 1/8 W
R624	6-185B99	47k; 1/8 W
R625	6-185A73	10k ±5%; 1/8 W
		THERMISTOR:
RT601	6-82462G03	195k @25°C (TLD8610A & TLD8620A only)
		MECHANICAL PARTS
	3-139506	SCREW, tapping 4-40 x 5/16"; 4 used
	42-84284B01	RETAINER; 4 used
	55-84300B04	HANDLE

Power Amplifier Heatsink Kit (P/O TLN4780A) PL-2657-A

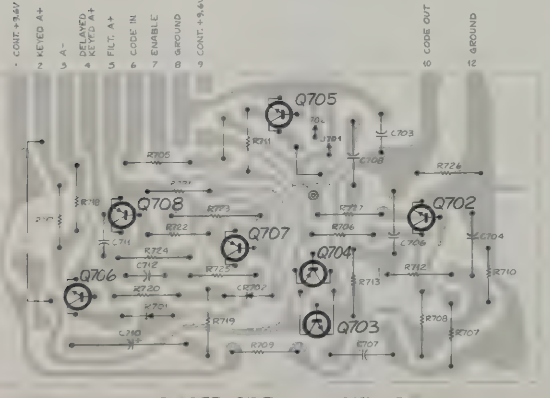
		CAPACITOR, fixed:
C780	23-83214C20	10 uF ±20%; 20 V
		COIL, RF: choke;
L780	24-80900A61	0.62 mH; coded BRN-ORG
		RESISTOR, fixed:
R780	6-124B67	8.2 ±5%; 1/4 W

PARTS LIST

TTN6003A Encoder Board PL-3298-A

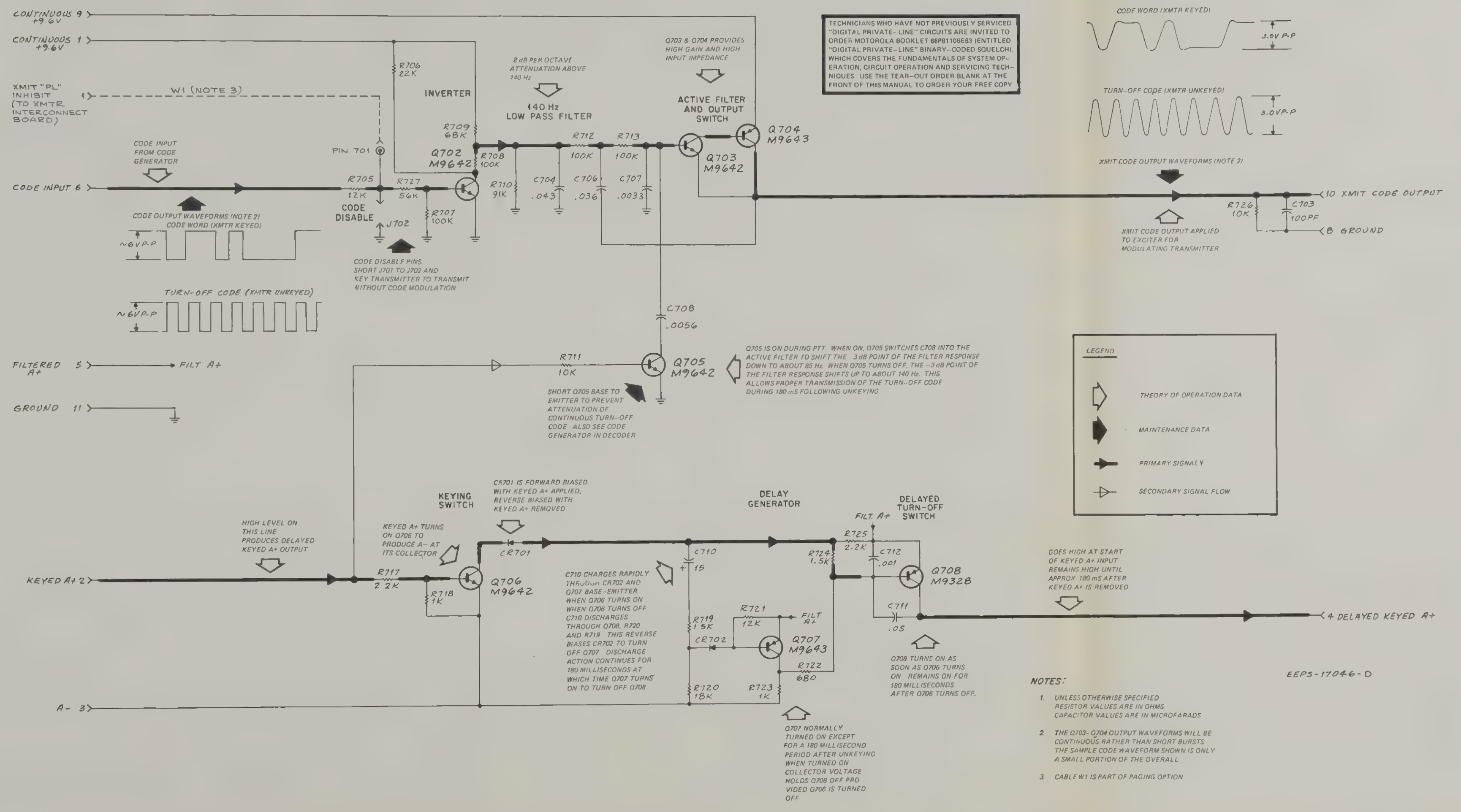
REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITOR, fixed: uF:
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	.001 ±10%: 10[illegible]
		DIODE: (SEE NOTE)
[illegible]	48-83654H01	silicon
		TRANSISTOR: (SEE NOTE)
[illegible]	48-869642	[illegible]: type M9642
[illegible]	48-869643	[illegible]: type M9643
[illegible]	48-869642	[illegible]: type M9642
[illegible]	48-869643	PNP: type M9643
[illegible]	48-869328	[illegible]: type M9328
		RESISTOR, fixed: ±5%: 1/4 W: unless otherwise stated
[illegible]	6-124A75	12k
[illegible]	6-124A81	22k
[illegible]	6-124A97	100k
[illegible]	6-124A93	68k
[illegible]	6-124A96	91k
[illegible]	6-124A73	10k
[illegible]	6-124A97	100k
[illegible]	6-124C57	2.2k ±10%
[illegible]	6-124C49	1k ±10%
[illegible]	6-124A53	1.5k
[illegible]	[illegible]	15k
[illegible]	[illegible]	12k
[illegible]	[illegible]	680
[illegible]	6-124A[illegible]	1k
[illegible]	6-124A[illegible]	1.5k
[illegible]	6-124C[illegible]	2.2k ±10%
[illegible]	6-124A73	10k
[illegible]	6-124A91	56k

For optimum performance, diodes, transistors and integrated circuits must be ordered by Motorola part numbers.


1 CONT. +9.6V
2 KEYED A+
3 A-
4 DELAYED KEYED A+
5 FILT. A+
6 CODE IN
7 ENABLE
8 GROUND
9 CONT. +9.6V
10 CODE OUT
12 GROUND
Q705
Q708
Q707
Q702
Q704
Q706
Q703
R705
R711
J701
C703
C708
R726
R718
R723
R722
R727
R706
C711
C706
C704
R724
C712
R725
R712
R710
R713
R720
CR702
R701
R719
R708
R707
C710
R709
C707
SOLDER SIDE

SHOWN FROM SOLDER SIDE

OL-CEPS-17C54-B


CONTINUOUS 9 +9.6V
CONTINUOUS 1 +9.6V
XMIT "PL" INHIBIT (TO XMTR INTERCONNECT BOARD)
W1 (NOTE 3)
CODE INPUT 6
PIN 701
R705 12K
CODE DISABLE
J702
R727 56K
R707 100K
R706 22K
INVERTER
R709 68K
Q702 M9642
R708 100K
R710 91K
140 Hz LOW PASS FILTER
C704 .043
C706 .036
C707 .0033
R712 100K
R713 100K
ACTIVE FILTER AND OUTPUT SWITCH
Q703 M9642
Q704 M9643
C708 .0056
R726 10K
C703 100PF
10 XMIT CODE OUTPUT
8 GROUND
CODE WORD (XMTR KEYED)
TURN-OFF CODE (XMTR UNKEYED)
~6VP-P
3.0V P-P
FILTERED A+ 5
FILT A+
GROUND 11
R711 10K
Q705 M9642
KEYED A+ 2
R717 2.2K
R718 1K
KEYING SWITCH
Q706 M9642
CR701
DELAY GENERATOR
C710 15
R719 1.5K
CR702
R721 12K
FILT A+
Q707 M9643
R722 680
R720 18K
R723 1K
R724 1.5K
R725 2.2K
FILT. A+
DELAYED TURN-OFF SWITCH
C712 .001
Q708 M9328
C711 .05
4 DELAYED KEYED A+
A- 3
EEPS-17046-D

CODE INPUT FROM CODE GENERATOR

CODE OUTPUT WAVEFORMS (NOTE 2)

CODE DISABLE PINS. SHORT J701 TO J702 AND KEY TRANSMITTER TO TRANSMIT WITHOUT CODE MODULATION

8 dB PER OCTAVE ATTENUATION ABOVE 140 Hz

Q703 & Q704 PROVIDES HIGH GAIN AND HIGH INPUT IMPEDANCE

TECHNICIANS WHO HAVE NOT PREVIOUSLY SERVICED "DIGITAL PRIVATE-LINE" CIRCUITS ARE INVITED TO ORDER MOTOROLA BOOKLET 68P81106E83 (ENTITLED "DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH), WHICH COVERS THE FUNDAMENTALS OF SYSTEM OPERATION, CIRCUIT OPERATION AND SERVICING TECHNIQUES USE THE TEAR-OUT ORDER BLANK AT THE FRONT OF THIS MANUAL TO ORDER YOUR FREE COPY

XMIT CODE OUTPUT WAVEFORMS (NOTE 2)

XMIT CODE OUTPUT APPLIED TO EXCITER FOR MODULATING TRANSMITTER

Q705 IS ON DURING PTT WHEN ON, Q705 SWITCHES C708 INTO THE ACTIVE FILTER TO SHIFT THE 3 dB POINT OF THE FILTER RESPONSE DOWN TO ABOUT 85 Hz. WHEN Q705 TURNS OFF, THE -3 dB POINT OF THE FILTER RESPONSE SHIFTS UP TO ABOUT 140 Hz. THIS ALLOWS PROPER TRANSMISSION OF THE TURN-OFF CODE DURING 180 mS FOLLOWING UNKEYING

SHORT Q705 BASE TO EMITTER TO PREVENT ATTENUATION OF CONTINUOUS TURN-OFF CODE ALSO SEE CODE GENERATOR IN DECODER

HIGH LEVEL ON THIS LINE PRODUCES DELAYED KEYED A+ OUTPUT

KEYED A+ TURNS ON Q706 TO PRODUCE A- AT ITS COLLECTOR

CR701 IS FORWARD BIASED WITH KEYED A+ APPLIED, REVERSE BIASED WITH KEYED A+ REMOVED

C710 CHARGES RAPIDLY THROUGH CR702 AND Q707 BASE-EMITTER WHEN Q706 TURNS ON WHEN Q706 TURNS OFF C710 DISCHARGES THROUGH Q708, R720 AND R719 THIS REVERSE BIASES CR702 TO TURN OFF Q707 DISCHARGE ACTION CONTINUES FOR 180 MILLISECONDS AT WHICH TIME Q707 TURNS ON TO TURN OFF Q708

Q707 NORMALLY TURNED ON EXCEPT FOR A 180 MILLISECOND PERIOD AFTER UNKEYING WHEN TURNED ON COLLECTOR VOLTAGE HOLDS Q708 OFF PROVIDED Q706 IS TURNED OFF

Q708 TURNS ON AS SOON AS Q706 TURNS ON REMAINS ON FOR 180 MILLISECONDS AFTER Q706 TURNS OFF.

GOES HIGH AT START OF KEYED A+ INPUT REMAINS HIGH UNTIL APPROX 180 mS AFTER KEYED A+ IS REMOVED

LEGEND

⇨	THEORY OF OPERATION DATA
➡	MAINTENANCE DATA
➔	PRIMARY SIGNAL
▷	SECONDARY SIGNAL FLOW

NOTES:

1. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS CAPACITOR VALUES ARE IN MICROFARADS
2. THE Q703-Q704 OUTPUT WAVEFORMS WILL BE CONTINUOUS RATHER THAN SHORT BURSTS THE SAMPLE CODE WAVEFORM SHOWN IS ONLY A SMALL PORTION OF THE OVERALL
3. CABLE W1 IS PART OF PAGING OPTION

SIMPLEX "DIGITAL PRIVATE-LINE" ENCODER

MODEL TTN6003A

APPLICATION -

"Micor" Base Stations with Simplex "Digital Private-Line" Binary-Coded Squelch.

FUNCTION --

1. Interfaces code word generator (located on "Digital Private-Line" Decoder Board) to the exciter. provides low pass active filter for 23-bit binary code word.
2. Generates delayed keyed A+ (180 millisecond transmitter turn-off delav.

"DIGITAL PRIVATE-LINE" ENCODER BOARD TROUBLESHOOTING CHART

SYMPTOM	PROBABLE CAUSES	ACTION
No delayed keyed A+ to exciter board.	1. No keyed A+ to encoder board (pin 2).	Check keyed A+ at pin 10 of P902 on exciter board
	2. Malfunction in delayed keyed A+ generation circuitry.	Check delayed turn-off switch, delay generator and keying switch operation on encoder board.
Delayed keyed A+ remains high less than 160 msec or longer than 220 msec after unkeying.	Malfunction in delayed keyed A+ circuits.	Check C710. Then check delav generator circuit.
No Output on Xmit code out (pin 10), keyed or unkeyed.	1. No input to encoder board pin 6 from decoder board.	On decoder board, check U801-5 for code signal. Check for 6.0 V dc at U801-24. If 6.0 V dc is present, check 50 kHz clock for proper operation (U801-4). If clock is ok, replace U801.
	2. Faulty inverter (Q702)	Check inverter operation.
	3. Active filter malfunction	Check Q703, Q704 operation.
Code (not turn-off code) is on encoder board pin 10 when the radio is unkeyed.	U801 code generator on decoder board is not switching.	On decoder board, ground U801-9. If code is still present at U801-5, check 50 kHz clock output (U801-4). If clock is ok, replace U801.
Turn-off code (not code) is on encoder board pin 10 when the radio is keyed.	U801 code generator on decoder board is not switching.	Apply +9.6 V at J805 on decoder board. If turn-off code is still present at U801-5, replace U801.
Excessive "code sound" heard at the speaker of radio listening to this transmitter.	1. Code deviation is greater than ±1 kHz	Check for proper waveform amplitude at encoder board pin 10 (Xmit code out).
	2. Low pass active filter is not switching from 140 Hz to 85 Hz.	Replace Q705.
Squelch tails are heard at the speaker of a radio listening to this transmitter.	1. No turn-off code is being transmitted.	Check the delayed keyed A+ duration (170-250 msec). Then check U801-5 on decoder board for presence of the turn-off code.
	2. Low pass active filter is always switched low (85 Hz).	Replace Q705.
No other radios in the system are enabled by this transmitter; code is being transmitted.	Wrong code is being transmitted.	Feed U801-5 from decoder board into a Motorola Model SLN6413A 'Digital Private-Line' test set. Check for proper decode. If proper decode is not obtained. Check for an intermittent or bad code plug (TRN6005A) or resistor network (Z801) on the decoder board. Check U801-15 thru U801-23 for a proper octal code.

SIMPLEX "DIGITAL PRIVATE-LINE" ENCODER/DUPLEX "DIGITAL PRIVATE-LINE" ENCODER

68P81028E63-B
1/20/77-UP

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Pow
AV
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nod
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508

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LEGEND

⇨ THEORY OF OPERATION DATA

➡ = MAINTENANCE DATA

→ = PRIMARY SIGNAL FLOW

⇾ = SECONDARY SIGNAL FLOW

PARTS LIST

TLN5725A Encoder Board PL-3300-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uF;
C701	21-82610C58	100 pF ±10%; 100 V
C702	21-82133G24	20 pF ±5%; 500 V
C703	21-82428B09	.0047 ±10%; 100 V
C704, 709	21-82187B22	270 pF ±10%; 200 V
C705	8-83813H14	.043 ±5%; 50 V
C706	8-83813H24	.036 ±5%; 50 V
C707	8-83813H27	.0033 ±5%; 50 V
C710	23-82783B24	15 ±10%; 25 V
C711	21-82372C04	.05 ±10%; 25 V
		DIODE: (SEE NOTE)
CR701, 702	48-83654H01	silicon
		TRANSISTOR: (SEE NOTE)
Q701	48-869652	field-effect; M9652
Q702, 703, 705, 706	48-869642	NPN; type M9642
Q704, 707	48-869643	PNP; type M9643
Q708	48-869328	PNP; type M9328
		RESISTOR, fixed: ±5%; 1/4 W; unless otherwise stated
R701, 704	6-124D14	470k ±10%
R702	6-124C77	15k ±10%
R703	6-124D04	180k ±10%
R705	6-124A83	27k
R706	6-124B02	150k
R707	6-124C85	33k ±10%
R708	6-124A79	18k
R709, 711	6-124C81	22k ±10%
R710, 717	6-124A89	47k
R712, 713	6-124A97	100k
R714	6-124A73	10k
R715	6-124C97	100k ±10%
R716	6-124C73	10k ±10%
R718	6-124C37	330 ±10%
		INTEGRATED CIRCUIT: (SEE NOTE)
U701	51-84267A82	type M6782
		VOLTAGE REGULATOR:
VR701	48-83696F07	Zener; 6.2 V
		CRYSTAL:
Y701	48-82003K01	resonator; 50.000 KC
		RESISTOR NETWORK:
Z701	1-80772B36 or 51-82142K02	pull-up, 10-pin
Z702	1-80772B35 or 51-82142K01	push-to-talk, 10-pin

NOTE: For optimum performance, diodes, transistors and integrated circuits must be ordered by Motorola part numbers.

E "PRIVATE-LINE" ENCODER

TLN5731A

1. DESCRIPTI

The "Private
frequency audio
transmitted rf sig

2. FUNCTION

2.1 GENERAL

The encode
tions.

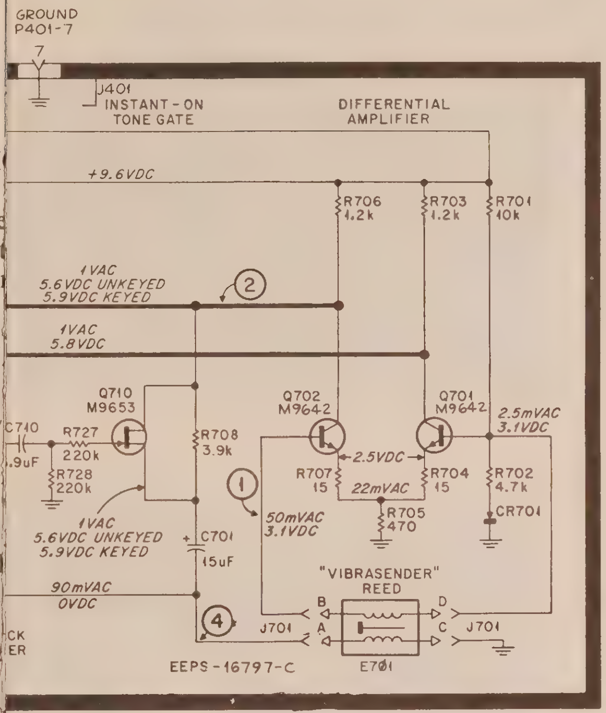
Tone Oscil
two equal-ampli
whenever power
amplifier provide
oscillation. The
mines the frequen

Reverse Bu
burst timing gen
delay of appro
transmitter is u
phase tone (rever
put circuit whi
"Vibrasponder"
eliminate the "sq
message.

Tone Outp
provides a fixed
the transmitter a
the reverse bu
"Vibrasponder"

2.2 TONE OSC

The tone os
station is "on
amplifier, forme
180° out of pha
signals are indep


GROUND
P401-7
7
J401
INSTANT-ON
TONE GATE
DIFFERENTIAL
AMPLIFIER
+9.6VDC
R706
1.2k
R703
1.2k
R701
10k
1VAC
5.6VDC UNKEYED
5.9VDC KEYED
2
1VAC
5.8VDC
Q710
M9653
Q702
M9642
Q701
M9642
2.5mVAC
3.1VDC
C710
.9uF
R727
220k
R728
220k
R708
3.9k
R707
15
2.5VDC
R704
15
R702
4.7k
1
22mVAC
R705
470
CR701
1VAC
5.6VDC UNKEYED
5.9VDC KEYED
C701
15uF
50mVAC
3.1VDC
"VIBRASENDER"
REED
90mVAC
0VDC
4
B
A
D
C
J701
J701
CK
ER
EEPS-16797-C
E701

"PL" ENCODER

701. ALL AC VOLTAGE MEASUREMENTS ARE RMS VALUES. ALL AC VOLTAGES ARE SINUSOIDAL EXCEPT Q708 EMITTER. METER READING DEPENDENT UPON METER RESPONSE TO NON-SINUSOIDAL WAVE.

702. DC VOLTAGE MEASUREMENTS IN Q705, Q706 AND Q707 STAGES TAKEN WITH RESPECT TO A-. VOLTAGES FOR ALL OTHER STAGES TAKEN WITH RESPECT TO CHASSIS GROUND. ALL DC VOLTAGES MAY BE MEASURED WITH 20,000 OHM-PER-VOLTMETER OR HIGH IMPEDANCE DC VOLTMETER (11 MEGOHM) EXCEPT BASE OF Q704 WHICH CAN ONLY BE MEASURED WITH A HIGH IMPEDANCE METER.

703. UNLESS OTHERWISE STATED: CAPACITOR VALUES ARE IN PICOFARADS. RESISTOR VALUES ARE IN OHMS.

704. PIN 701 IS USED ONLY FOR CERTAIN OPTIONAL EQUIPMENT.

705. PINS J401-6 AND -7 ON THE PL ENCODER MATE WITH PINS P401-11 AND -12 ON THE EXCITER.

NEPS-7051-B

DUPLEX "DIGITAL PRIVATE-LINE" ENCODER

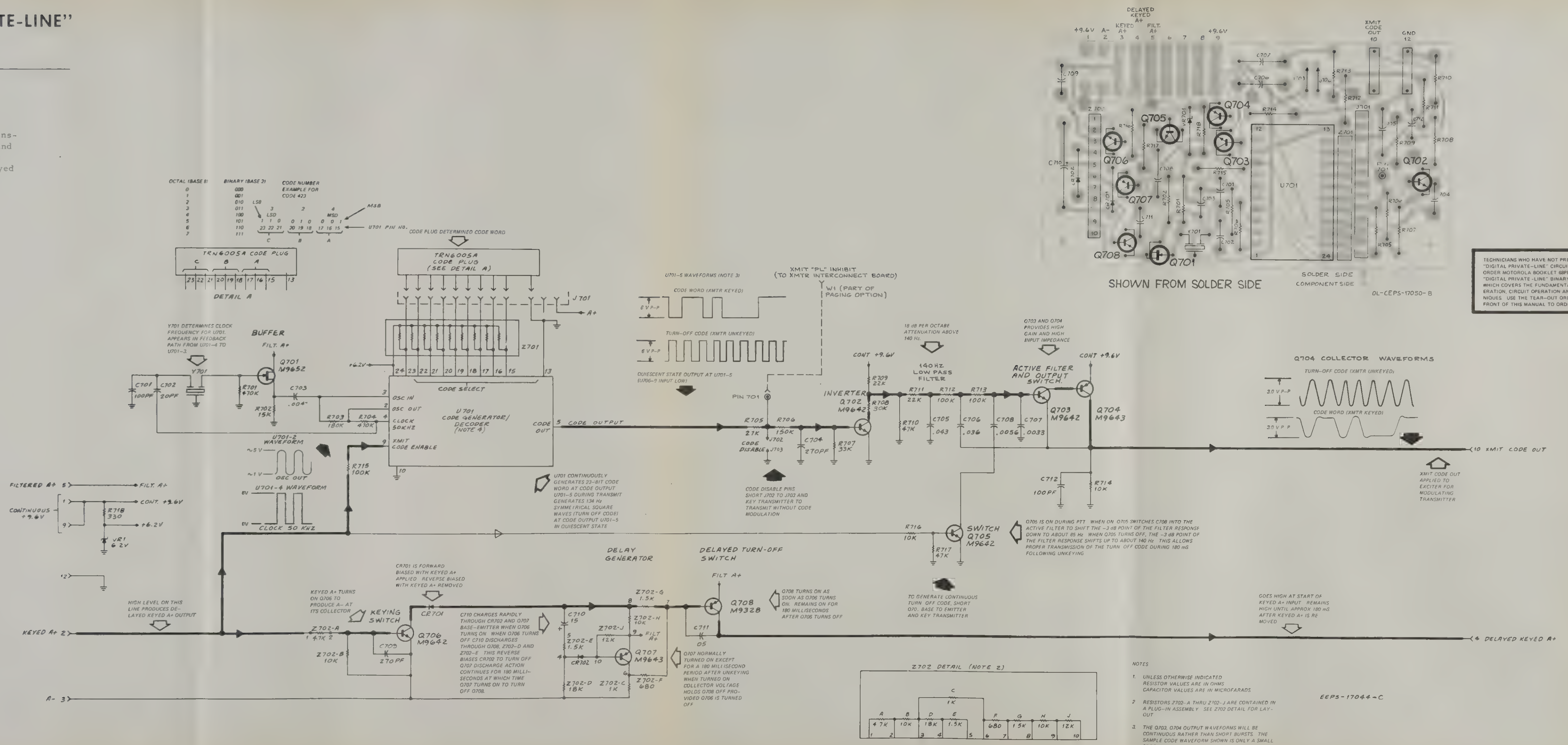
MODEL TLN5725A

APPLICATION --

"Micor" Base Stations & Repeaters

FUNCTION --

Generates "Digital Private-Line" Code for transmitter in duplex applications (where decoder and encoder may be on simultaneously). Develops 180 mS transmitter turn-off delay (delayed keyed A+).


OCTAL (BASE 8)
BINARY (BASE 2)
CODE NUMBER EXAMPLE FOR CODE 423
LSB
LSD
MSD
MSB
U701 PIN NO.
TRN6005A CODE PLUG
DETAIL A
CODE PLUG DETERMINED CODE WORD
TRN6005A CODE PLUG (SEE DETAIL A)
J701
A+
Z701
BUFFER
FILT. A+
Q701 M9652
Y701
C701 100PF
C702 20PF
R701 470K
C703 .004
R702 15K
R703 180K
R704 470K
+6.2V
CODE SELECT
OSC IN
OSC OUT
CLOCK 50KHZ
XMIT CODE ENABLE
U701 CODE GENERATOR/ DECODER (NOTE 4)
CODE OUT
CODE OUTPUT
U701-2 WAVEFORM
OSC OUT
U701-4 WAVEFORM
CLOCK 50 KHZ
R715 100K
FILTERED A+ 5
FILT. A+
CONTINUOUS +9.6V
CONT. +9.6V
R718 330
+6.2V
VR1 6.2V
U701-5 WAVEFORMS (NOTE 3)
CODE WORD (XMTR KEYED)
TURN-OFF CODE (XMTR UNKEYED)
6 V P-P
XMIT "PL" INHIBIT (TO XMTR INTERCONNECT BOARD)
W1 (PART OF PAGING OPTION)
PIN 701
R705 27K
R706 150K
J702
CODE DISABLE J703
C704 270PF
R707 33K
INVERTER Q702 M9642
CONT +9.6V
R709 22K
R708 30K
R710 47K
140 HZ LOW PASS FILTER
R711 22K
R712 100K
R713 100K
C705 .043
C706 .036
C708 .0056
C707 .0033
ACTIVE FILTER AND OUTPUT SWITCH
Q703 M9642
Q704 M9643
C712 100PF
R714 10K
10 XMIT CODE OUT
Q704 COLLECTOR WAVEFORMS
TURN-OFF CODE (XMTR UNKEYED)
CODE WORD (XMTR KEYED)
3.0 V P-P
R716 10K
R717 47K
SWITCH Q705 M9642
DELAY GENERATOR
DELAYED TURN-OFF SWITCH
FILT A+
KEYED A+ 2
Z702-A 4.7K
Z702-B 10K
KEYING SWITCH
Q706 M9642
C709 270PF
CR701
C710 15
Z702-E 1.5K
CR702
Z702-J 12K
Z702-H 10K
Z702-G 1.5K
Q707 M9643
Z702-D 18K
Z702-C 1K
Z702-F 680
Q708 M9328
C711 .05
4 DELAYED KEYED A+
A- 3
Z702 DETAIL (NOTE 2)
4.7K
10K
18K
1.5K
1K
680
1.5K
10K
12K
DELAYED KEYED A+
KEYED A+
FILT. A+
+9.6V
XMIT CODE OUT
GND
Q701
Q702
Q703
Q704
Q705
Q706
Q707
Q708
U701
SOLDER SIDE
COMPONENT SIDE
OL-CEPS-17050-B

SHOWN FROM SOLDER SIDE

Y701 DETERMINES CLOCK FREQUENCY FOR U701. APPEARS IN FEEDBACK PATH FROM U701-4 TO U701-3.

U701 CONTINUOUSLY GENERATES 23-BIT CODE WORD AT CODE OUTPUT U701-5 DURING TRANSMIT. GENERATES 134 Hz SYMMETRICAL SQUARE WAVES (TURN OFF CODE) AT CODE OUTPUT U701-5 IN QUIESCENT STATE

QUIESCENT STATE OUTPUT AT U701-5 (U706-9 INPUT LOW)

CODE DISABLE PINS SHORT J702 TO J703 AND KEY TRANSMITTER TO TRANSMIT WITHOUT CODE MODULATION

18 dB PER OCTABE ATTENUATION ABOVE 140 Hz.

Q703 AND Q704 PROVIDES HIGH GAIN AND HIGH INPUT IMPEDANCE

XMIT CODE OUT APPLIED TO EXCITER FOR MODULATING TRANSMITTER

Q705 IS ON DURING PTT. WHEN ON, Q705 SWITCHES C708 INTO THE ACTIVE FILTER TO SHIFT THE -3 dB POINT OF THE FILTER RESPONSE DOWN TO ABOUT 85 Hz. WHEN Q705 TURNS OFF, THE -3 dB POINT OF THE FILTER RESPONSE SHIFTS UP TO ABOUT 140 Hz. THIS ALLOWS PROPER TRANSMISSION OF THE TURN OFF CODE DURING 180 mS FOLLOWING UNKEYING

TO GENERATE CONTINUOUS TURN OFF CODE, SHORT Q70_ BASE TO EMITTER AND KEY TRANSMITTER

HIGH LEVEL ON THIS LINE PRODUCES DELAYED KEYED A+ OUTPUT

KEYED A+ TURNS ON Q706 TO PRODUCE A- AT ITS COLLECTOR

CR701 IS FORWARD BIASED WITH KEYED A+ APPLIED. REVERSE BIASED WITH KEYED A+ REMOVED

C710 CHARGES RAPIDLY THROUGH CR702 AND Q707 BASE-EMITTER WHEN Q706 TURNS ON. WHEN Q706 TURNS OFF C710 DISCHARGES THROUGH Q708, Z702-D AND Z702-E. THIS REVERSE BIASES CR702 TO TURN OFF Q707. DISCHARGE ACTION CONTINUES FOR 180 MILLISECONDS AT WHICH TIME Q707 TURNS ON TO TURN OFF Q708.

Q707 NORMALLY TURNED ON EXCEPT FOR A 180 MILLISECOND PERIOD AFTER UNKEYING. WHEN TURNED ON COLLECTOR VOLTAGE HOLDS Q708 OFF PROVIDED Q706 IS TURNED OFF

Q708 TURNS ON AS SOON AS Q706 TURNS ON. REMAINS ON FOR 180 MILLISECONDS AFTER Q706 TURNS OFF

GOES HIGH AT START OF KEYED A+ INPUT. REMAINS HIGH UNTIL APPROX 180 mS AFTER KEYED A+ IS REMOVED.

NOTES

1. UNLESS OTHERWISE INDICATED RESISTOR VALUES ARE IN OHMS CAPACITOR VALUES ARE IN MICROFARADS
2. RESISTORS Z702-A THRU Z702-J ARE CONTAINED IN A PLUG-IN ASSEMBLY. SEE Z702 DETAIL FOR LAYOUT
3. THE Q703, Q704 OUTPUT WAVEFORMS WILL BE CONTINUOUS RATHER THAN SHORT BURSTS. THE SAMPLE CODE WAVEFORM SHOWN IS ONLY A SMALL PORTION OF THE OVERALL
4. U701 IS A CMOS DEVICE. OBSERVE CMOS HANDLING PRECAUTIONS

EEPS-17044-C

TECHNICIANS WHO HAVE NOT PREVIOUSLY SERVICED "DIGITAL PRIVATE-LINE" CIRCUITS ARE INVITED TO ORDER MOTOROLA BOOKLET 68P81106E83 (ENTITLED "DIGITAL PRIVATE-LINE" BINARY CODED SQUELCH) WHICH COVERS THE FUNDAMENTALS OF SYSTEM OPERATION, CIRCUIT OPERATION AND SERVICING TECHNIQUES. USE THE TEAR-OUT ORDER BLANK AT THE FRONT OF THIS MANUAL TO ORDER YOUR FREE COPY

LEGEND

- ▷ THEORY OF OPERATION DATA
- ◆ MAINTENANCE DATA
- ➔ PRIMARY SIGNAL FLOW
- ▷ SECONDARY SIGNAL FLOW

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPT[illegible]

PARTS LIST

TLN[illegible] Encoder Board

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	PNP; type M964
[illegible]	[illegible]	PNP; type M9328
[illegible]	[illegible]	[illegible]

TONE "PRIVATE-LINE" ENCODER

MODEL TLN5731A

TECHNICAL CHARACTERISTICS

"PL" TONE FREQUENCY	Selected from 67-210 Hz range
FREQUENCY DETERMINING DEVICE	"Vibrasender" Resonant Reed
STABILITY	±0.15%
LEVEL (nominal)	350 mV rms
OUTPUT IMPEDANCE	4.7k ohms
POWER REQUIREMENTS	+9.6 V dc @15 mA

1. DESCRIPTION

The "Private-Line" (PL) encoder generates a low-frequency audio tone for continuous modulation of the transmitted rf signal in "Private-Line" operation.

2. FUNCTIONAL OPERATION

2.1 GENERAL

The encoder may be divided into three major sections.

Tone Oscillator -- The tone oscillator generates two equal-amplitude tone signals 180° out-of-phase whenever power is applied to the radio. A feedback amplifier provides negative feedback to limit the level of oscillation. The "Vibrasender" resonant reed determines the frequency of operation.

Reverse Burst Timing Generator -- The reverse burst timing generator provides a transmitter turn-off delay of approximately 150 milliseconds after the transmitter is unkeyed. During this period, a shifted phase tone (reverse burst) is developed in the tone output circuit which dampens the oscillations of the "Vibrasponder" resonant reed in listening receivers to eliminate the "squelch tail" noise burst at the end of the message.

Tone Output Circuit -- The tone output circuit provides a fixed level tone output to the modulator of the transmitter and shifts the phase of the tone during the reverse burst period to rapidly dampen the "Vibrasponder" resonant reeds in listening receivers.

2.2 TONE OSCILLATOR

The tone oscillator operates continuously while the station is "on". The outputs of the differential amplifier, formed by Q701 and Q702, are identical but 180° out of phase. The amplitudes of these collector signals are independent of frequency. A positive feedback signal is coupled through C701 and R708 which biases Q710 on through R727. To quickly bring the tone output up to full output, Q710 acts as a shunt around R708, which increases the positive feedback. After approximately 1.5 seconds (voltage across C710 reaches 9.0 volts) Q710 turns off and has no further effect on circuit operation. The output of Q701 is applied to feedback amplifier Q708 through C704 and R712. When the signal level exceeds a fixed amount, Q708 is biased into operation. It provides a negative feedback signal which keeps the oscillator out of limiting, thus provided a sinusoidal wave output. The "Vibrasender" resonant reed is the frequency determining device of the oscillator. It acts as a very high Q, narrow bandpass transformer, coupling only its resonant frequency and blocking all others. At its resonant frequency, the reed vibrates to couple energy from the primary to the secondary winding.

2.3 REVERSE BURST TIMING CIRCUIT

In the unkeyed transmitter condition, delay generator, Q706, is forward biased through CR703 and R719 to A- placing A+ across R721. This voltage is coupled to the base of the delayed turn-off switch (Q707) by R722, and Q707 is biased "off".

When the PTT button is closed, keyed filtered A+ is applied to R716 and turns on the keying switch, Q705. With Q705 acting as a short circuit:

--Q707 is biased "on" through R723, CR702 and Q705 to A-.

--Keyed, filter A+ is applied through Q707 to turn on the transmitter.

--C708 charges from the filtered A+ line through Q706 base-emitter junction, CR730 and R718.

--The PL switch gate, Q709, is turned on by bias current through R726 and Q705. This action turns off PL tone gate, Q703.

Note that Q706 has not changed states and is still turned on by bias current through R719.

When the PTT button is released, the keyed, filter A+ bias is removed from Q705 and it turns off. The transmitter continues to receive A+ from Q707 during the following sequence of events; with Q705 turned off:

--The PL switch gate, Q709, is turned off, activating the PL tone gate, Q703, which passes the reverse burst tone signal.

--C708 discharges through R718, R719, R721, R722 and R723, back biasing CR703 and turning off Q706.

--With Q706 off, Q707 remains on by receiving base bias through R722 and R721.

--After approximately 150 milliseconds, the voltage across C708 decreases to the point where Q706 turns on again and applies A+ across R721.

--The A+ across R721 turns off Q707 which removes the delayed keyed filter A+ from the transmitter.

2.4 TONE OUTPUT CIRCUIT

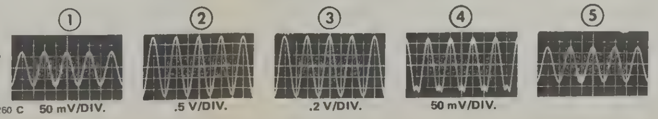
When the transmitter is keyed, PL gate switch Q709 is turned on. Q709, in turn, gates 9.6 volts to PL tone gate Q703, turning it off. When Q703 is turned off, only the output of Q701 is coupled to emitter follower Q704. When the transmitter is unkeyed, Q709 is turned off and Q703 is turned on which completes the tone path from Q702 to C703. The two tone signals 180° out of phase, combine through the phase shift capacitors to produce a signal to the emitter follower that is 240° out of phase with the original tone. Emitter follower Q704 provides impedance matching in a low impedance ouput and isolates the tone oscillator from the external circuit to which the tone output is applied.

EPS-17757-B

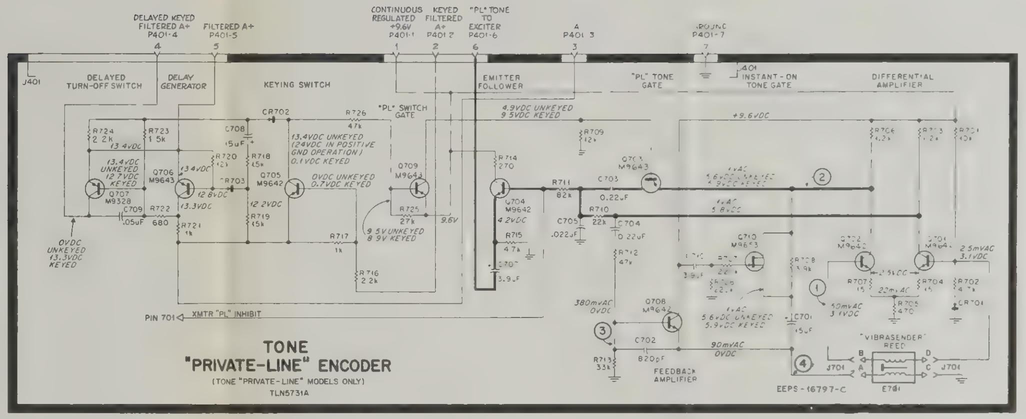
TONE "PL" ENCODER WAVEFORMS

OSCILLOSCOPE WAVEFORMS MEASURED UNDER FOLLOWING CONDITIONS

1. WAVEFORMS SHOWN USING 100 Hz "VIBRASENDER" RESONANT REED
2. VERTICAL SENSITIVITY SHOWN UNDER EACH WAVEFORM
3. HORIZONTAL DEFLECTION = 5 msec/DIV
4. ALL WAVEFORMS MEASURED IN RESPECT TO CHASSIS GROUND



EPS-6260 C



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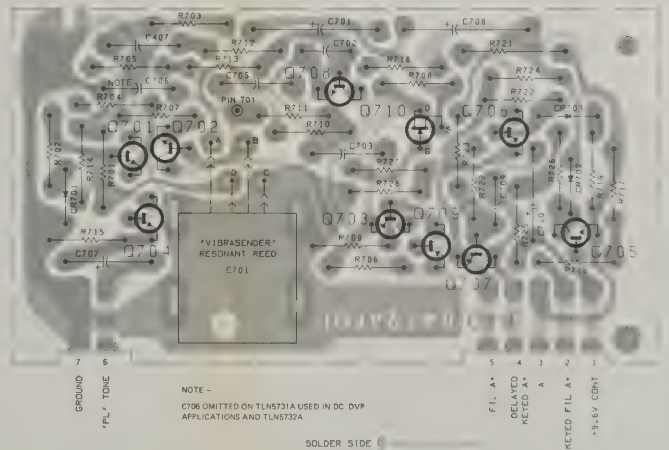


NOTE -

C706 OMITTED ON TLN5731A USED IN DC DVP APPLICATIONS AND TLN5732A

"PL" ENCODER

701 ALL AC VOLTAGE MEASUREMENTS ARE RMS VALUES ALL AC VOLTAGES ARE SINUSOIDAL EXCEPT Q708 EMITTER METER READING DEPENDENT UPON METER RESPONSE TO NON-SINUSOIDAL WAVE

702 DC VOLTAGE MEASUREMENTS IN Q705 Q706 AND Q707 STAGES TAKEN WITH RESPECT TO A VOLTAGES FOR ALL OTHER STAGES TAKEN WITH RESPECT TO CHASSIS GROUND ALL DC VOLTAGES MAY BE MEASURED WITH 20.000 OHM-PER VOLTMETER OR HIGH IMPEDANCE DC VOLTMETER (11 MEGOHM) EXCEPT BASE OF Q704 WHICH CAN ONLY BE MEASURED WITH A HIGH IMPEDANCE METER

703 UNLESS OTHERWISE STATED CAPACITOR VALUES ARE IN PICOFARADS RESISTOR VALUES ARE IN OHMS

704 PIN 701 IS USED ONLY FOR CERTAIN OPTIONAL EQUIPMENT

705 PINS J401-6 AND -7 ON THE PL ENCODER MATE WITH PINS P401-11 AND -12 ON THE EXCITER

NEPS-7051-B

PARTS LIST

TLN4739A Board & Panel Kit (p/o TLN1434A) PL-1708-C

C1 thru 8, 10 thru 24, 26 thru 32	21-82543H01	CAPACITOR, fixed: 1500 pF +100-0%; 500 V
C9, 25	21-82543H05	470 pF±20%;500 V(YEL-VIO-BRN
		COIL, RF: choke;
L1, 2, 3, 5, 7, 8, 11, 13, 14	24-83977B01	1-1/2 turns thru ferrite block
L4, 6, 9, 10, 12, 15, 16	24-83961B01	3 turns over ferrite bead; coded BRN

TLN4738A Filter Chassis and Hardware Kit PL-3547-0

	43-83281F01	BUSHING; 2 req'd.
	27-84171D01	CHASSIS, filter
	15-84169D01	COVER, filter
	14-84173D01	INSULATOR, filter cable
	4-8412	LOCKWASHER #4 split; 10 req'd
	4-7607	WASHER, flat .125-.281 x .027" 4 req'd.
	3-134168	SCREW, tapping 4-40 x 1/4", Phillips; 2 req'd.
	3-134309	SCREW, tapping 4-40 x 3/16", Phillips; 12 req'd.
	3-114834	SCREW, machine 4-40 x 1"; 2 req'd.
	2-9627	NUT, 4-40 x 3/16" x 3/32" Hex; 8 req'd.
	3-15728A24	SCREW, machine; 4-40 x 5/8"; 6 req'd.
	32-84410D01	SHIM, silicon, rubber; 4 req'd.
	42-84431D01	CLAMP, flat wire
	42-84431D02	CLAMP, flat wire

REVISIONS

68P81015E21-C

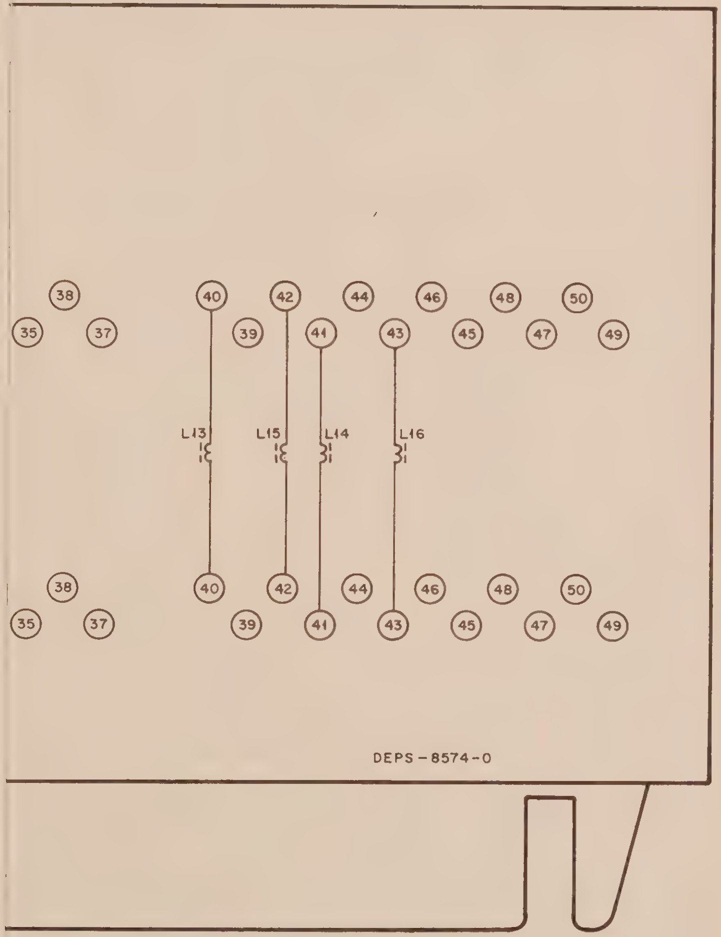
CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
TLN1434A (TLN4739A-1)	C9, 25	FROM 21-82543H01, 1500 pF TO 21-82543H05, 470 pF	PARTS LIST

TRANSMITTER SHIELD

TLN1434A

MODEL COMPLEMENT		
L	SUFFIX	DESCRIPTION
38A		FILTER CHASSIS AND HARDWARE KIT
39 A		BOARD AND PANEL KIT

EPS-21030-O



TRANSMITTER SHIELD

service publications
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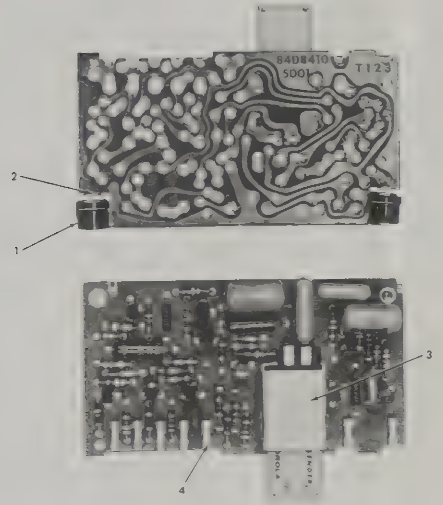
TONE "PRIVATE-LINE" ENCODER

MODEL TLN5731A


8408410
500
T123
1
2
3
4

AEPS-6945-O

MECHANICAL PARTS LIST

TLN5731A and TLN4293B
"Private-Line" Encoder PL-1308-D

REF	MOTOROLA PART NO.	DESCRIPTION
	42-84284B01	RETAINER, screw: 2 req'd
2	3-138162	LOCKSCREW, tapping: No 4 x 3/8" Phillips hex head; 2 req'd
3	42-84116B02	SOCKET & BRACKET ASSEMBLY for "Vibrasender" Resonant Reed
4	9-83011H01	TERMINAL, pin: female 7 req'd

ELECTRICAL PARTS LIST

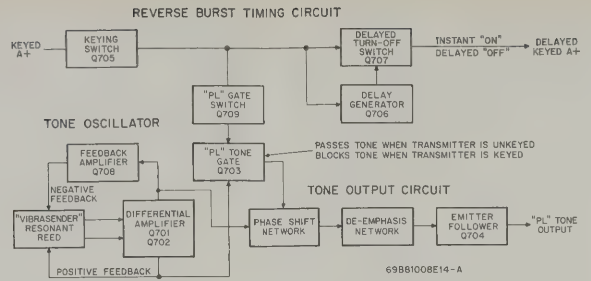
TLN5731A Tone "Private-Line" Encoder PL-3260-C

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uF; ±10%: 50 V; unless otherwise stated
C701	23-84762H09	15 ±20%: 20 V
C702	21-82187B23	820 pF: 500 V
C703, 704	8-82905G32	0.22
C705	8-83813H08	.022
C706		NOT USED
C707	23-84762H08	3.9 uF ±20%: 15 V
C708	23-83214C26	15; 25 V
C709	21-82372C04	.05: +80-20%: 25 V
C710	23-84762H08	3.9 uF ±20%: 15 V
		DIODE: (SEE NOTE I)
CR701, 702, 703	48-83654H01	silicon
		CONNECTOR, receptacle:
J401		consists of 7 female contact terminals (Part No. 9-83011H01) mounted on edge of circuit board
		"VIBRASENDER" RESONANT REED: (SEE NOTE II)
E701	TLN6824A	"plug-in" unit
		TRANSISTOR: (SEE NOTE I)
Q701, 702	48-869570 or 48-869642	NPN, type M9570 NPN; type M9642
Q703	48-869571 or 48-869643	PNP; type M9571 PNP; type M9643
Q704, 705	48-869570 or 48-869642	NPN; type M9570 NPN; type M9642
Q706	48-869571 or 48-869643	PNP; type M9571 PNP; type M9643
Q707	48-869328	PNP; type M9328
Q708	48-869570 or 48-869642	NPN; type M9570 NPN; type M9642
Q709	48-869571 or 48-869643	PNP; type M9571 PNP; type M9643
Q710	48-869653	FET; type M9653
		RESISTOR, fixed: ±5%, 1/4 W; unless otherwise stated
R701	6-124A73	10k
R702	6-124A65	4.7k
R703, 706	6-124A51	1.2k
R704	6-124A05	15
R705	6-124A41	470
R707	6-124A05	15
R708	6-124A63	3.9k
R709	6-124C75	12k ±10%
R710	6-124A81	22k
R711	6-124A95	82k
R712	6-124A89	47k
R713	6-124A85	33k
R714	6-124C35	270 ±10%
R715	6-124A65	4.7k
R716	6-124C57	2.2k ±10%
R717	6-124C49	1k ±10%
R718	6-124A53	1.5k
R719	6-124A77	15k
R720	6-124A75	12k
R721	6-125A49	1k
R722	6-124A45	680
R723	6-124A53	1.5k
R724	6-124C57	2.2k ±10%
R725	6-124C83	27k ±10%
R726	6-124C89	47k ±10%
R727, 728	6-124D06	220k ±10%

NOTES:

I. For optimum performance, replacement diodes and transistors must be ordered by Motorola part number.

II. The "Vibrasender" Resonant Reed (Model KLN6210A) is not a part of the encoder board. When ordering a complete board, the reed must be ordered separately.


REVERSE BURST TIMING CIRCUIT
KEYED A+
KEYING SWITCH Q705
DELAYED TURN-OFF SWITCH Q707
INSTANT "ON"
DELAYED "OFF"
DELAYED KEYED A+
"PL" GATE SWITCH Q709
DELAY GENERATOR Q706
TONE OSCILLATOR
FEEDBACK AMPLIFIER Q708
"PL" TONE GATE Q703
PASSES TONE WHEN TRANSMITTER IS UNKEYED
BLOCKS TONE WHEN TRANSMITTER IS KEYED
NEGATIVE FEEDBACK
TONE OUTPUT CIRCUIT
"VIBRASENDER" RESONANT REED
DIFFERENTIAL AMPLIFIER Q701 Q702
PHASE SHIFT NETWORK
DE-EMPHASIS NETWORK
EMITTER FOLLOWER Q704
"PL" TONE OUTPUT
POSITIVE FEEDBACK

69B81008E14-A

MAINTENANCE

a. Recommended Test Equipment

(1) Motorola SLN6221A "Private-Line" Tone Generator -- used for testing "Vibrasender" resonant reeds.

(2) Motorola Solid-State AC Voltmeter -- used for tone level measurement.

(3) General purpose oscilloscope -- valuable for signal tracing and locating sources of distortion.

(4) Motorola Solid-State DC Multimeter -- used for dc voltage measurement.

(5) Motorola S1343 Series Frequency Counter or S1344 Series Frequency Counter/Deviation Meter -- used for measuring PL tone frequency.

b. Performance Test

Measure frequency deviation of the transmitter in which the PL encoder is installed. With the transmitter keyed and PL tone modulation (only), deviation should read ±0.5 to ±1.0 kHz.

c. Troubleshooting

(1) If no deviation is measured the trouble may lie in the tone oscillator or tone output circuit. The trouble may be isolated by the following steps.

(a) Check 9.6-volt input to encoder.

(b) Check ac signal voltage at collector of Q701.

(c) If signal is present, check Q704.

(d) If no signal is present any component in the oscillator loop could cause the trouble. Check the "Vibrasender" resonant reed in the SLN6221A "Private-Line" Tone Generator.

(e) If the tone generator does not produce an output signal the reed is defective.

(f) If the reed is good, replace it in the encoder and make dc voltage measurement in the tone oscillator circuit to locate the defective components.

(2) If low deviation is measured, check ac signal voltages and compare them with the chart readings to find the source of trouble.

(3) If deviation is normal, but calls are not being received, check the frequency of the PL encoder tone. If off-frequency, replace the "Vibrasender" resonant reed.

(4) If squelch tail noise bursts are heard by all listening receivers, check dc voltages of Q703 and Q706 is keyed and unkeyed conditions.

(5) If the transmitter cannot be keyed, and the trouble has been isolated to the PL encoder board, measure dc voltages in Q705 and Q707 stages.

(6) If too much tone deviation is measured, check feedback amplifier Q708.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

PARTS LIST

TLN4739A Board & Panel Kit (p/o TLN1434A) PL-1708-C

thru 8, thru 24, 32	21-82543H01	CAPACITOR, fixed: 1500 pF +100-0%; 500 V
[illegible]	21-82543H05	470 pF±20%;500 V(YEL-VIO-BRN
		COIL, RF: choke;
2,3,5,7,8, 14	24-83977B01	1-1/2 turns thru ferrite block
4, 6, 9, 10, 16	24-83961B01	3 turns over ferrite bead; coded BRN

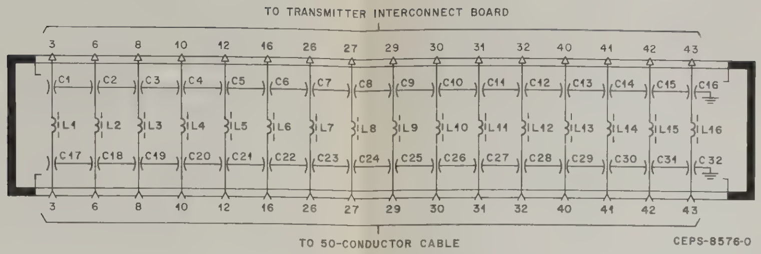
TLN4738A Filter Chassis and Hardware Kit PL-3547-0

	43-83281F01	BUSHING; 2 req'd.
	27-84171D01	CHASSIS, filter
	15-84169D01	COVER, filter
	14-84173D01	INSULATOR, filter cable
	4-8412	LOCKWASHER #4 split; 10 req'd
	4-7607	WASHER, flat .125-.281 x .027" 4 req'd.
	3-134168	SCREW, tapping 4-40 x 1/4", Phillips; 2 req'd.
	3-134309	SCREW, tapping 4-40 x 3/16", Phillips; 12 req'd.
	3-114834	SCREW, machine 4-40 x 1"; 2 req'd.
	2-9627	NUT, 4-40 x 3/16" x 3/32" Hex; 8 req'd.
	3-15728A24	SCREW, machine; 4-40 x 5/8"; 6 req'd.
	32-84410D01	SHIM, silicon, rubber; 4 req'd.
	42-84431D01	CLAMP, flat wire
	42-84431D02	CLAMP, flat wire

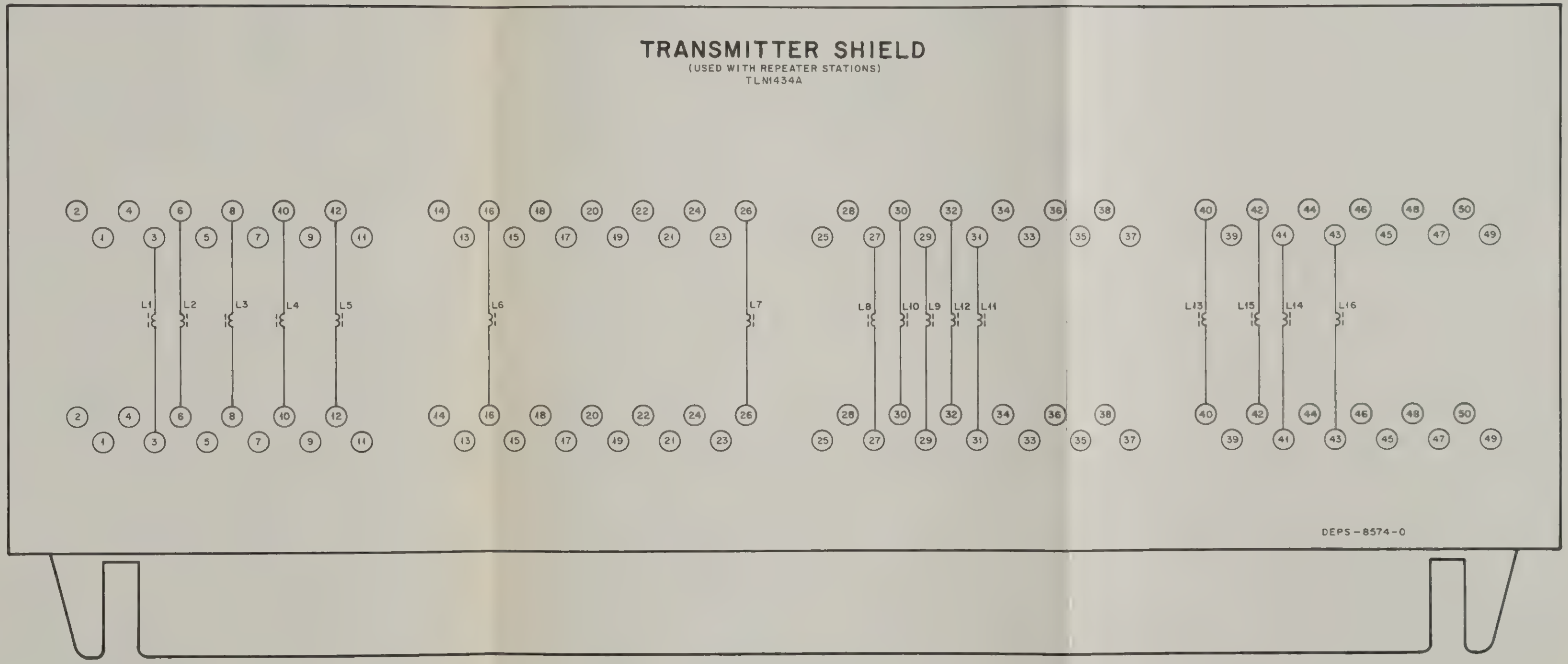
REVISIONS

68P81015E21-C

CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
TLN1434A (TLN4739A-1)	C9,25	FROM 21-82543H01, 1500 pF TO 21-82543H05, 470 pF	PARTS LIST


TO TRANSMITTER INTERCONNECT BOARD
3 6 8 10 12 16 26 27 29 30 31 32 40 41 42 43
C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16
L1 L2 L3 L4 L5 L6 L7 L8 L9 L10 L11 L12 L13 L14 L15 L16
C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C30 C31 C32
3 6 8 10 12 16 26 27 29 30 31 32 40 41 42 43
TO 50-CONDUCTOR CABLE
CEPS-8576-0

TRANSMITTER SHIELD
TLN1434A
(USED WITH REPEATER MODELS ONLY)
ALL CAPACITOR VALUES ARE 470 pF


TRANSMITTER SHIELD
(USED WITH REPEATER STATIONS)
TLN1434A
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
L1 L2 L3 L4 L5 L6 L7 L8 L10 L9 L12 L11 L13 L15 L14 L16
DEPS-8574-0

TRANSMITTER SHIELD

TLN1434A

MODEL COMPLEMENT		
MODEL	SUFFIX	DESCRIPTION
TLN4738A		FILTER CHASSIS AND HARDWARE KIT
TLN4739A		BOARD AND PANEL KIT

EPS-21030-O

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PARTS LIST

TLN4728A Xmtr. Chassis & Heat Sink PL-1838

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80728B50	CHASSIS ASSEMBLY: includes: 7-84221B01 BRACKET 26-84198B02 HEATSINK 27-84349D01 CHASSIS 1-80728B01 BRACKET ASSEMBLY: includes: BRACKET ref. items C902, C904, C9 & C909
	27-84350D01	CHASSIS
	7-84354D01	BRACKET
	41-84144C01	SPRING, retaining
	3-50378	TERMINAL STRIP
	14-84210A01	INSULATOR
	4-84152B01	WASHER, shoulder
	14-84290B01	INSULATOR, pa
	26-84588B01	SHIELD
	43-84219C01	SPACER
	55-84300B01	HANDLE

NOTE:

Electrical components for TLN4728A are listed in the Power Amplifier and Transmitter Interconnect sections.

TLN4730A Xmtr. Hardware Kit PL-1774-C

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80709B41	SHIELD ASSEMBLY
	1-80731B73	SHIELD ASSEMBLY, excite
	3-84141D01	SCREW, captive; 4 req'd
	15-84352D01	COVER, rear; xmtr.
	15-84300B01	COVER, bottom, xmtr.
	55-84300B01	HANDLE, large
	55-84300B02	HANDLE, small

TLN4741A PA Hardware Kit PL-183

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80727B91	BRACKET ASSEMBLY; incl 7-84407D01 BRACKET ref items C571, C572 & C57
	9-84234E10	JACK, test; white; 3 req'd
	26-84402D01	SHIELD
	14-84290B02	INSULATOR

NOTE:

Electrical components for TLN4741A are listed in the Power Amplifier and Power Control sections.

TLN4742A Hardware Kit PL-185

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80727B91	BRACKET ASSEMBLY; incl 7-84407D01 BRACKET, mounting 4-83755H01 WASHER, sold 7 req'd ref. items C571, C572 & C5
	9-84234E10	JACK, test; white; 3 req'd
	26-84402D02	SHIELD, power amplifier

NOTE:

Electrical components for TLN4742A are listed in the Power Amplifier and Power Control sections.

TLN5074A Terminal Bracket Kit PL-185

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	7-84354D01	BRACKET, terminal board
	31-50378	TERMINAL BOARD, 2 ter

NOTE:

Electrical components for TLN5074A are listed in the Power Amplifier section.

TRANSMITTER HARDWARE KITS

132-174 MHz

DDEL TABLE

TYPE OF STATION USED WITH			
INTERMITTENT DUTY	CONTINUOUS DUTY	60 W	HI PWR
X			X
X		X	X
	X		X
	X	X	
	X	X	X
	X	X	X
X		X	
	X	X	X
X		X	X
	X	X	X
	X	X	X
X		X	X

TLN5902A/TLN5913A Shield, Transmitter PL-5095-O

	1-80793B77	COVER ASSEMBLY includes:
	1-80793B78	COVER SUBASSEMBLY includes:
	64-82673L01	COVER
	3-138162	SCREW, tapping: 4-40 x 3/8''; 4 used
	42-84284B01	RETAINER, screw; 4 used
	3-139495	SCREW, tapping: 6-20 x 5/16''; 5 used
	26-82676L01	SHIELD, xmtr (TLN5902A)
	26-82910L01	SHIELD, xmtr (TLN5913A)

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REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION

PARTS LIST

TLN4728A Xmtr. Chassis & Heat Sink PL-1838-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
	1-80728B50	CHASSIS ASSEMBLY: includes: 7-84221B01 BRACKET 26-84198B02 HEATSINK 27-84349D01 CHASSIS 1-80728B01 BRACKET ASSEMBLY: includes: BRACKET ref. items C902, C904, C907 & C909
	27-84350D01	CHASSIS
	7-84354D01	BRACKET
	41-84144C01	SPRING, retaining
	3-50378	TERMINAL STRIP
	14-84210A01	INSULATOR
	4-84152B01	WASHER, shoulder
	14-84290B01	INSULATOR, pa
	26-84588B01	SHIELD
	43-84219C01	SPACER
	55-84300B01	HANDLE

NOTE:

Electrical components for TLN4728A are listed in the Power Amplifier and Transmitter Interconnect sections.

TLN4730A Xmtr. Hardware Kit PL-1774-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
	1-80709B41	SHIELD ASSEMBLY
	1-80731B73	SHIELD ASSEMBLY, exciter
	3-84141D01	SCREW, captive; 4 req'd
	15-84352D01	COVER, rear; xmtr.
	15-84300B01	COVER, bottom, xmtr.
	55-84300B01	HANDLE, large
	55-84300B02	HANDLE, small

TLN4741A PA Hardware Kit PL-1834-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
	1-80727B91	BRACKET ASSEMBLY; includes: 7-84407D01 BRACKET ref items C571, C572 & C573
	9-84234E10	JACK, test; white; 3 req'd
	26-84402D01	SHIELD
	14-84290B02	INSULATOR

NOTE:

Electrical components for TLN4741A are listed in the Power Amplifier and Power Control sections.

TLN4742A Hardware Kit PL-1855-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
	1-80727B91	BRACKET ASSEMBLY; includes: 7-84407D01 BRACKET, mounting 4-83755H01 WASHER, solder; 7 req'd ref. items C571, C572 & C573
	9-84234E10	JACK, test; white; 3 req'd
	26-84402D02	SHIELD, power amplifier

NOTE:

Electrical components for TLN4742A are listed in the Power Amplifier and Power Control sections.

TLN5074A Terminal Bracket Kit PL-1857-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
	7-84354D01	BRACKET, terminal board
	31-50378	TERMINAL BOARD, 2 terminal

NOTE:

Electrical components for TLN5074A are listed in the Power Amplifier section.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

TLN4744A Exciter Hardware Kit PL-1829-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80727B99	FILTER ASSEMBLY: includes: 64-84014E01 PLATE, mounting 4-83755H01 WASHER, solder; 2 req'd ref. items C911 & C912
	1-80730B02	CHASSIS ASSEMBLY: includes: 27-84140D01 CHASSIS, exciter 1-80728B01 BRACKET ASSEMBLY includes: 7-84948D01 BRACKET 4-83755H01 WASHER, solder; 4 req'd ref. items C902, C904, C907 & C909
	7-84221B01	BRACKET
	15-84165D01	COVER, exciter
	15-84166D01	COVER, rear
	15-84301E01	COVER, front
	41-84144C01	SPRING, retaining

NOTE:

Electrical components for TLN4744A are listed in the Transmitter Interconnect section.

TLN4822A Cable & Bracket Kit PL-1828-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80727B94	BRACKET ASSEMBLY: includes: 7-84405D01 BRACKET 9-84935D01 SOCKET, transistor 4-83755H01 WASHER, solder; 3 req'd ref. items C565, C566 & C570
	14-865875	INSULATOR, mica

NOTE:

Cable assemblies for TLN4822A are listed in the rf cables section; electrical components are listed in the Power Amplifier and Transmitter Interconnect sections.

TLN4781A Xmtr. Chassis & Heat Sink Kit PL-1836-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80728B50	CHASSIS ASSEMBLY: includes: 1-80728B01 BRACKET ASSEMBLY: includes: 7-84948D01 BRACKET 4-83755H01 WASHER, solder; 4 req'd ref items C902, C904, C907 & C909 7-84221B01 BRACKET 26-84198B02 HEATSINK 27-84349D01 CHASSIS
	27-84350D01	CHASSIS
	7-84354D01	BRACKET
	41-84144C01	SPRING, retaining
	31-50378	TERMINAL BOARD, 2 terminal
	14-84210A01	INSULATOR
	4-84152B01	WASHER, shoulder
	14-84020C01	INSULATOR
	26-84588B01	SHIELD
	43-84219C01	SPACER
	55-84300B01	HANDLE
	4-83755H01	WASHER, solder, 2 req'd

NOTE:

Electrical components for TLN4781A are listed in the Power Amplifier and Transmitter Interconnect sections.

TRANSMITTER HARDWARE KITS

132-174 MHz

MODEL TABLE

MODEL	DESCRIPTION	TYPE OF STATION USED WITH			
		INTERMITTENT DUTY	CONTINUOUS DUTY	60 W	HI PWR
TLN4728A	CHASSIS & HEAT SINK	X			X
TLN4730A	XMTR HARDWARE KIT	X		X	X
TLN4741A	PA HARDWARE KIT		X		X
TLN4742A	PA HARDWARE KIT		X	X	
TLN4744A	XCTR HARDWARE KIT		X	X	X
TLN4780A	PA CASTING & HARDWARE KIT		X	X	X
TLN4781A	XMTR CHASSIS & HEAT SINK	X		X	
TLN4822A	INPUT BRACKET & CABLE		X	X	X
TLN5074A	TERMINAL BRACKET	X		X	X
TRN6188A	"PL" ENCODER HARDWARE KIT		X	X	X
TLN5902A	SHIELD, xmtr		X	X	X
TRN6974A	SHIELD, xmtr	X		X	X

TRN6188A Hardware Kit, "PL" Encoder PL-5094-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	2-7019	NUT, hex; 4-40 x 1/4 x 3/32"; 2 used
	3-139495	SCREW, tapping: 6-20 x 5/16"; 2 used
	7-82618K01	BRACKET
	14-83809K01	INSULATOR, board
	75-82902K01	PAD, rubber

TRN6974A Shield, Transmitter PL-5512-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80793B77	COVER ASSEMBLY includes:
	1-80793B78	COVER SUBASSEMBLY includes:
	64-82673L01	COVER
	3-138162	SCREW, tapping: 4-40 x 3/8"; 4 used
	42-84284B01	RETAINER: 4 used
	3-139495	SCREW, tapping: 6-20 x 5/16"; 5 used
	26-83146L01	SHIELD

TLN5902A/TLN5913A Shield, Transmitter PL-5095-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80793B77	COVER ASSEMBLY includes:
	1-80793B78	COVER SUBASSEMBLY includes:
	64-82673L01	COVER
	3-138162	SCREW, tapping: 4-40 x 3/8"; 4 used
	42-84284B01	RETAINER, screw; 4 used
	3-139495	SCREW, tapping: 6-20 x 5/16"; 5 used
	26-82676L01	SHIELD, xmtr (TLN5902A)
	26-82910L01	SHIELD, xmtr (TLN5913A)

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"PRIVATE-LINE" INHIBIT CABLE KIT

MODEL TKN6631A

DESCRIPTION

This cable kit is an 18 inch, single lead used in systems that inhibit the transmitted "Private-Line" code in certain modes of operation (such as paging). Cable interconnection is between TLN5731A "Private-Line" Encoder pin 701 and TLN4729B/TLN4743B Transmitter Interconnect Unit pin 30.

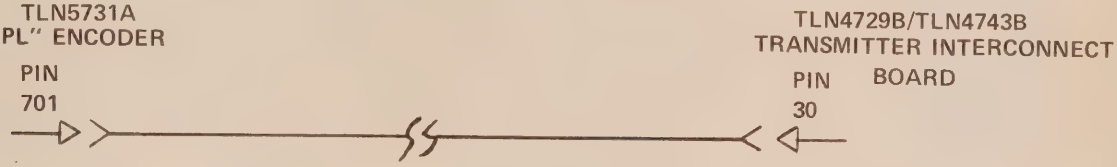
TLN5731A
"PL" ENCODER
PIN
701
TLN4729B/TLN4743B
TRANSMITTER INTERCONNECT
BOARD
PIN
30

Figure 1. TKN6631A Cable Kit

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DESCRIPTION 68P81017E23
INSTALLATION 68P81015E19
UPRIGHT OUTDOOR CABINET 68P81033E42
"COMPA–STATION" OUTDOOR CABINET 68P81033E46
MAINTENANCE 68P81017E24
ANTENNA SWITCH & MISCELLANEOUS HARDWARE 68P81014E92
FILTERS AND DUPLEXERS 68P81102E85
METERING AND INTERCOM 68P81033E28
STATION HARDWARE KIT 68P81033E23

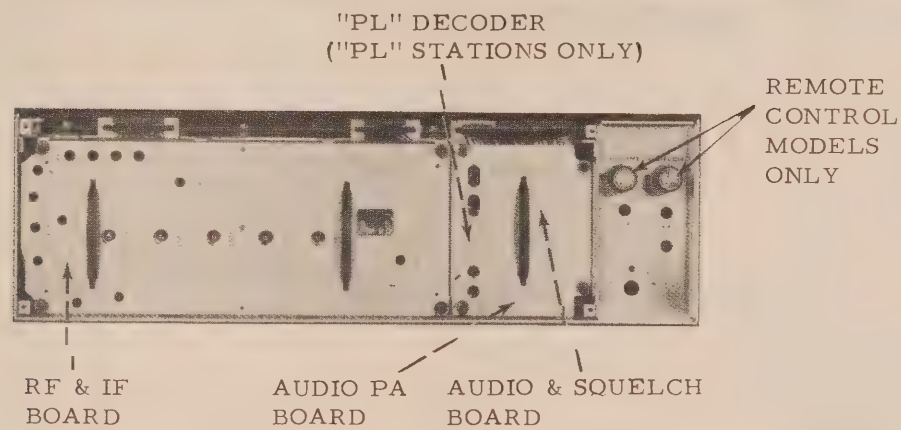
TRANSMITTER INTERCONNECT BOARD 68P81033E78
TRANSMITTER INTRODUCTION 68P81016E64
TRANSMITTER INTERCONNECT UNIT 68P81026E69
EXCITER 68P81026E66
90/100/110 WATT POWER AMPLIFIER 68P81026E67
60 WATT POWER AMPLIFIER 68P81015E12
POWER CONTROL BOARD 68P81015E07
SIMPLEX "DIGITAL PRIVATE–LINE" ENCODER 68P81028E63
DUPLEX "DIGITAL PRIVATE–LINE" ENCODER 68P81028E64
"PRIVATE–LINE" ENCODER 68P81026E71
TRANSMITTER SHIELD UNIT 68P81015E21
TRANSMITTER HARDWARE KITS 68P81016E57
"PRIVATE–LINE" DISABLE CABLE KIT 68P81026E77

RECEIVER INTRODUCTION 68P81026E76
RECEIVER INTERCONNECT BOARD 68P81034E07
RECEIVER INTERCONNECT UNIT 68P81026E72
RECEIVER RF & IF BOARD 68P81015E02
RECEIVER AUDIO & SQUELCH BOARD 68P81025E79
AUDIO POWER AMPLIFIER 68P81014E97
"DIGITAL PRIVATE–LINE" DECODER 68P81028E66
"PRIVATE–LINE" DECODER 68P81026E73
RECEIVER SHIELD UNIT 68P81025E14
RF PREAMPLIFIER & CABLE 68P81016E33
2–RECEIVER COUPLER 68P81016E62
RECEIVER HARDWARE KIT 68P81034E24

POWER SUPPLY 68P81033E41
POWER SUPPLY 68P81020E44

SCHEMATIC DIAGRAM AND ALIGNMENT PROCEDURE 68P81103E49
RF INTERCABLING SECTION (INTERMITTENT DUTY STATIONS) 68P81016E97
RF INTERCABLING SECTION (CONTINUOUS DUTY STATIONS) 68P81016E98
RF INTERCABLING SECTION (CONTINUOUS DUTY STATION WITH UNIFIED CONTROL CHASSIS 68P81034E06

RECEIVER INTRODUCTION
132-174 MHz



AEPS-9232-B

The receiver used in the "Micor" "Compa-Station" base and repeater stations consists of the items shown in the receiver model charts at the end of this section. All receiver items are assembled on a single chassis or "shelf" in the station. All receiver items are described in the following receiver instruction sections with the exception of rf intercabling which is detailed in the rf intercabling section at the front of this manual. The receiver chassis & hardware kit is parts listed at the end of this section.

Some stations include two receivers and in a few of these stations, one of the receivers may have a shifted i-f. This occurs when the separation between the two operating carrier frequencies is mathematically related to the i-f. The receiver rf & i-f section gives specific conditions when this occurs. All two-receiver stations include a 2-receiver coupler which is described behind the STATION DIAGRAMS tab.

Stations operating in the 132-174 MHz range can use an optional rf preamplifier. The preamplifier increases the sensitivity of the receiver and is particularly useful in two-receiver stations. The preamplifier more than makes up the half power loss in each leg of the 2-receiver coupler. The rf preamplifier is described in detail in the instruction section 68P81016E33 of this manual.

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MOTOROLA

RECEIVER
MODEL CHART
FOR
132-174 MHz
"MICOR" "COMPA-STATION" BASE RADIO
AND REPEATER STATIONS
(LATER VERSIONS)
"BB" SUFFIX MODELS

CODE:

☒ - ONE ITEM INCLUDED

MODEL	DESCRIPTION	TLD8271B RF & IF BOARD (132-142 MHz)	TLD8272B RF & IF BOARD (142-150.8 MHz)	TLD8273B RF & IF BOARD (150.8-162 MHz)	TLD8274B RF & IF BOARD (162-174 MHz)	TRN6006A AUDIO & SQUELCH BOARD	TLN4290B AUDIO POWER AMPLIFIER	TLN4726B RECEIVER INTERCONNECT BOARD	TLN4727A RECEIVER CHASSIS & HARDWARE ASSEMBLY	TKN6570A RECEIVER RF CABLE	TLN5655A INTERCONNECT BOARD	TLN5912A HARDWARE KIT, 2ND RCVR
TRD1801BB	RECEIVER (132-142 MHz)	X				X	X	X	X	X		
TRD1802BB	RECEIVER (142-150.8 MHz)		X			X	X	X	X	X		
TRD1803BB	RECEIVER (150.8-162 MHz)			X		X	X	X	X	X		
TRD1804BB	RECEIVER (162-174 MHz)				X	X	X	X	X	X		
TLN1865A	2ND RECEIVER									X	X	X

EPS-16887-C

MOTOROLA

RECEIVER
MODEL CHART
FOR
132-174 MHz
"MICOR" "COMPA-STATION" BASE RADIO
AND REPEATER STATIONS
(EARLIER VERSION)
"AB" SUFFIX MODELS

CODE:

☒ - ONE ITEM INCLUDED

	ITEM	TLD8271A	TLD8272A	TLD8273A	TLD8274A	TLN4725A	TLN4290B	TLN4726A	TLN4727A	TKN6570A
	DESCRIPTION	RF & IF BOARD (132-142 MHz)	RF & IF BOARD (142-150.8 MHz)	RF & IF BOARD (150.8-162 MHz)	RF & IF BOARD (162-174 MHz)	AUDIO & SQUELCH BOARD	AUDIO POWER AMPLIFIER	RECEIVER INTERCONNECT BOARD	RECEIVER CHASSIS & HARDWARE ASSEMBLY	RECEIVER RF CABLE
MODEL	DESCRIPTION									
TRD1801AB	RECEIVER (132-142 MHz)	☒				☒	☒	☒	☒	☒
TRD1802AB	RECEIVER (142-150.8 MHz)		☒			☒	☒	☒	☒	☒
TRD1803AB	RECEIVER (150.8-162 MHz)			☒		☒	☒	☒	☒	☒
TRD1804AB	RECEIVER (162-174 MHz)				☒	☒	☒	☒	☒	☒

EPS-8818-B

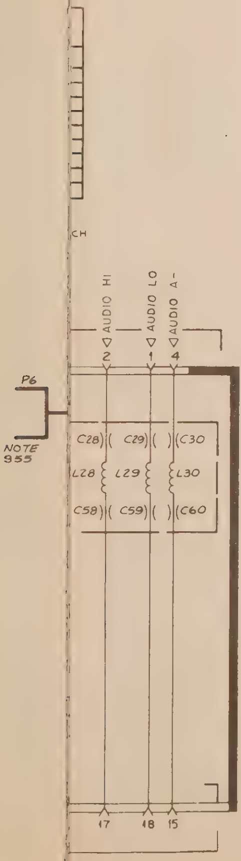
RECEIVER INTERCONNECT BOARD

FUNCTION -

Interconnects various receiver circuit boards to the unified chassis interconnect board. Model differences are primarily rf filtering.

MODEL	APPLICATION
TLN5646A	WITH REPEATER STATIONS
TLN5648A	WITH BASE STATIONS (1ST RCVR ONLY)
TLN5655A	WITH BASE STATIONS (2ND RCVR ONLY)
TRN6196A (OPTIONAL)	IN PLACE OF TLN5646A OR TLN5648A (PROVIDES ADDITIONAL FILTERING)
TRN6308A (OPTIONAL)	IN PLACE OF TLN5655A (PROVIDES ADDITIONAL FILTERING)

EPS-23197-O



NOTES:

951. JU960 IS CUT FOR DIGITAL "PL" REPEATER STATIONS AND FULL DUPLEX DIGITAL "PL" BASE STATIONS.

952. SEE FOLLOWING TABLE FOR FILTERING COMPONENT USAGE BY MODEL. MODEL TLN5648A DOES NOT USE ANY FILTERING COMPONENTS, BUT INCORPORATES "THRU" PLATING INSTEAD. (PLATING RUNS AND FILTERING COMPONENTS DO NOT EXIST SIMULTANEOUSLY). SEE PARTS LIST FOR COMPONENT VALUES AND PART NUMBERS.

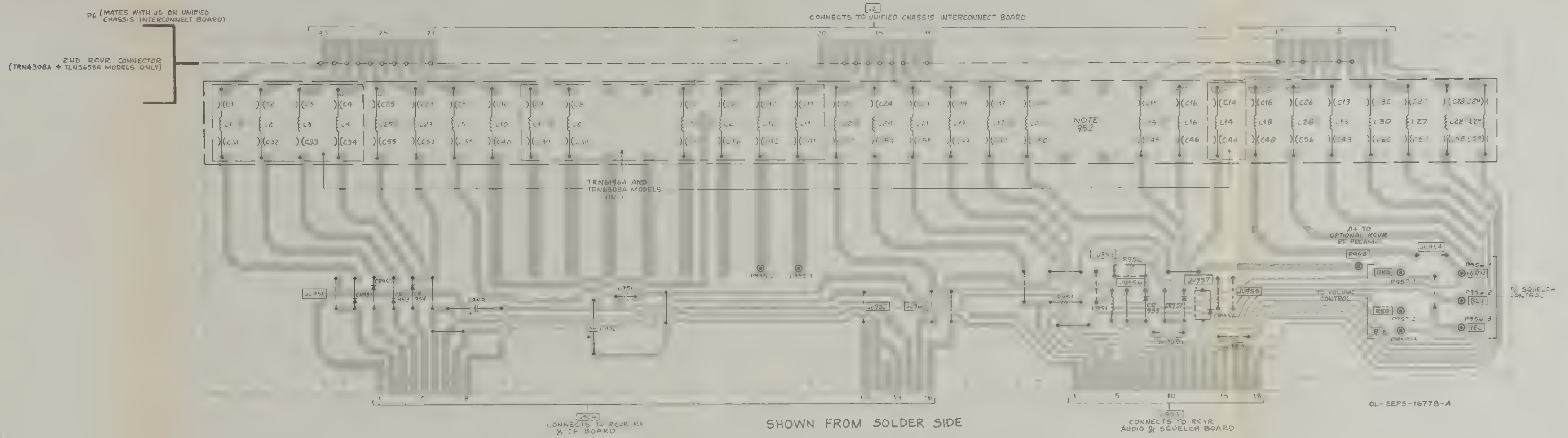
TLN5646A	TLN5648A	TLN5655A	TRN6196A	TRN6308A
C1 THRU C60	NOT USED	C5, C10–C14, C19–C25, C27, C30, C35, C40–C44, C49–C55, C57, C60	C1 THRU C60	C1 THRU C60
L5, L10, L13, L15–L30	NOT USED	L5, L10–L14, L19–L25, L27, L30	L1 L30	L1 -L30

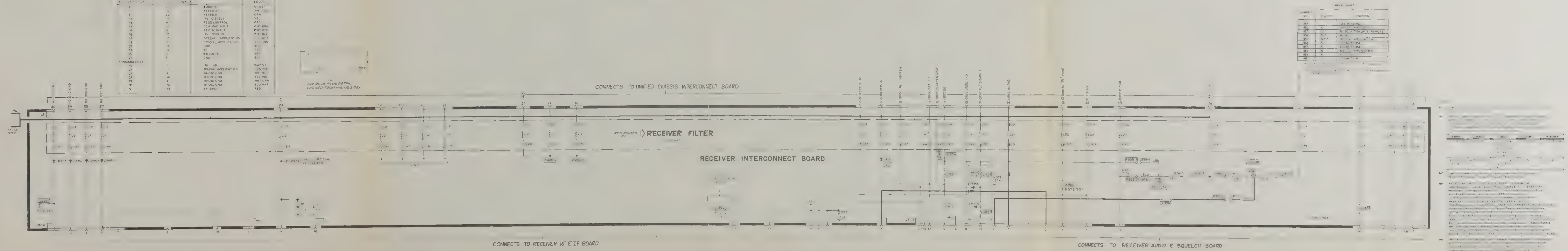
953. JU951 IS CONNECTED IN SINGLE–FREQUENCY RECEIVERS ONLY. RECEIVER CHANNEL ELEMENTIS ALWAYS ACTIVATED.

954. AN OPTIONAL MODE OF RECEIVER OPERATION KNOWN AS "AND SQUELCH" CAN BE ADDED WHEN DESIRABLE. THIS FEATURE PROVIDES "VARIABLE PL SENSITIVITY" (PL–CODED SQUELCH PLUS ADJUSTABLE NOISE-ACTIVATED [CARRIER] SQUELCH). IN THIS MODE, THE RECEIVER AUDIO CHANNEL IS ACTIVATED WHEN A PL CODE IS RECEIVED AND THE CARRIER SQUELCH THRESHOLD LEVEL IS EXCEEDED. SINCE THE CARRIER (NOISE–ACTIVATED) SQUELCH CIRCUIT SENSITIVITY IS ADJUSTABLE, AND SINCEIT IS ONE OF THE CONTROLLING FACTORS IN THE SQUELCHING OF RECEIVER AUDIO, THE OPERATION CAN BE APTLY DESCRIBED AS "VARIABLE PL SENSITIVITY". THUS "AND SQUELCH" DENOTES BOTH PL–CODED SQUELCH AND CARRIER SQUELCH OPERATING SIMULTANEOUSLY. CR955, CR956, & R952 ARE USED AND JUMPERS JU956 AND JU957 ARE OMITTED FOR "AND" SQUELCH OPERATION (JU204 ON AUDIO &S QUELCH BOARD MUST ALSO BE CUT) AND ARE NOT PART OF THE RECEIVER INTERCONNECT BOARD.

955. TWO–RCVR STATIONS USE THE TLN5655A VERSION BOARD TO INTERCONNECT THE 2ND RCVR TO THE UNIFIED CHASSIS INTERCONNECT BOARD. THIS VERSION BOARD DOES NOT PLUG DIRECTLY INTO THE UNIFIED CHASSIS BOARD BUT RATHER IS INTERCONNECTED VIA P6. P6 IS CONNECTED TO THE RCVR INTERCONNECT BOARD J AS DETAILED IN THE 2ND RCVR CONNECTION TABLE

956. CR957 REMOVED ON TLN6196A FOR REPEAT OR DUPLEX OPERATION


P6 (MATES WITH J6 ON UNIFIED CHASSIS INTERCONNECT BOARD)
2ND RCVR CONNECTOR (TRN6308A & TLN5655A MODELS ONLY)
CONNECTS TO UNIFIED CHASSIS INTERCONNECT BOARD
TRN6196A AND TRN6308A MODELS ONLY
NOTE 952
J6 TO OPTIONAL RCVR RF PREAMP
TO VOLUME CONTROL
TO SQUELCH CONTROL
CONNECTS TO RCVR RF & IF BOARD
SHOWN FROM SOLDER SIDE
CONNECTS TO RCVR AUDIO & SQUELCH BOARD
BL-EEPS-19778-A


2ND RCVR CONNECTIONS
CONNECTS TO UNIFIED CHASSIS INTERCONNECT BOARD
RECEIVER FILTER
RECEIVER INTERCONNECT BOARD
CONNECTS TO RECEIVER RF & IF BOARD
CONNECTS TO RECEIVER AUDIO & SQUELCH BOARD

RECEIVER INTERCONNECT BOARD

FUNCTION -

[illegible] s receiver circuit boards t[illegible] interconnect board. Model [illegible] e primarily rf filter [illegible]

MODEL	APPLICATION
TLN5646A	WITH REPEATER STATIONS
TLN5648A	WITH BASE STATIONS (1ST RCVR ONLY)
TLN5655A	WITH BASE STATIONS (2ND RCVR ONLY)
TRN6196A (OPTIONAL)	IN PLACE OF TLN5646A OR TLN5648A (PROVIDES ADDITIONAL FILTERING)
TRN6308A (OPTIONAL)	IN PLACE OF TLN5655A (PROVIDES ADDITIONAL FILTERING)

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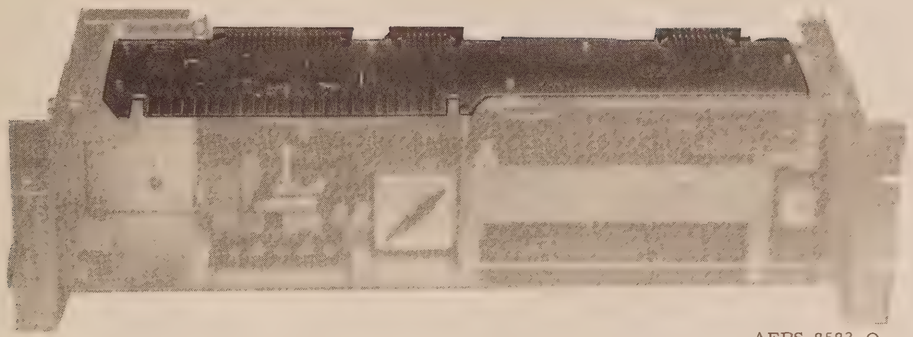
3P81034E07-C
4/5/77-UP

RECEIVER INTERCONNECT BOARD

MODEL TLN4726B



AEPS-8582-O

1. DESCRIPTION

The receiver interconnect board connects the receiver rf and i-f board and the receiver audio and squelch board to the station 50-conductor intercable.

A number of jumpers are provided to allow use of the board in single and two-receiver stations, and local and remote control stations. Jumper connections for these modes of operations are shown in Table 1.

2. "AND SQUELCH" OPERATION

An optional mode of receiver operation known known as "AND SQUELCH" can be added when desirable. This feature provides "variable PL sensitivity" (tone-coded squelch plus adjustable noise-activated [carrier] squelch).

In this mode, the receiver audio channel is activated when a PL tone is received and the carrier squelch threshold level is exceeded. Since the carrier (noise-activated) squelch circuit sensitivity is adjustable, and since it is one of the controlling factors in the squelching of receiver audio, the operation can be aptly described as "variable PL sensitivity". Thus "AND SQUELCH" denotes both tone-coded squelch and carrier squelch operating simultaneously.

Conversion of the receiver to the "AND SQUELCH" mode of operation requires the addition of certain components to the RECEIVER INTERCONNECT UNIT, and the omission of certain jumpers in both the RECEIVER INTERCONNECT UNIT and the AUDIO & SQUELCH BOARD.

The parts required to convert the receiver to "AND SQUELCH" operation are listed on the back of the schematic diagram.

Refer to the AUDIO & SQUELCH section of this manual for further details relating to "AND SQUELCH" operation.

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REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION

PARTS LIST

NOTE

This parts list covers five models of the Receiver Interconnect Board. Where differences exist, the model number of the applicable unit is given in the Description column.

TLN5646A TLN5648A/TLN5655A TRN6196A TRN6308A
Receiver Interconnect Board PL-3435-

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITOR, fixed:
C1 thru 60	21-861219	1000 pF +100-0%; 500 V (TRN6196A & TRN6308A)
C951	21-82428B59	.01 uF +80-20%; 200 V
C952, 953	23-84762H09	15 uF ±20%; 20 V
		DIODE: (SEE NOTE)
CR951 thru 954, 957	23-84762H09	silicon
		[illegible]
L1 thru 4, 6 thru 9, 11, 12, 14, 15 thru [illegible]	24-83961B01	3 turns; coded brown
L5, 10, 13, 22, 23, 27 thru 30	24-83977B01	1-1/2 turns
L901	24-82549D03	1000 uH
		[illegible] plug
P6	--	(TLN5655A) [illegible]
	14-84556B01	HOUSING, connector
	9-84151B03	CONTACT, receptacle: 14 req'd.
P6	--	(TRN6308A) includes:
	14-84556B01	HOUSING, connector
	9-84151B03	CONTACT, receptacle: 20 req'd.
		RESISTOR, fixed:
R951	6-124C61	3.3k ±10%; 1/4 W
NON-REFERENCED ITEMS		
	7-82626K01	BRACKET, filter
	14-82621K01	INSULATOR (TLN5648A & TLN5655)
	1-80775B75	COVER ASSEMBLY, filter (TLN5646A, TLN5655A, TRN6196A & TRN6308A) includes
	15-82173K01	COVER, filter
	3-138162	SCREW, tapping: 4-40 x 3/8 5 used (TLN5646A, TRN6196A & TRN6308A)
	3-139495	SCREW, tapping: 6-20 x 5/16 4 used (TLN5646A, TLN5648A, TRN6196A & TRN6308A)
	42-84284B01	RETAINER, screw: 5 used (TLN5646A, TRN6196A & TRN6308A)
	3-139495	SCREW, tapping: 6-20 x 5/16" 7 used (TLN5655A)
	42-82143C02	CLAMP, cable: 1/4" ID; 2 used (TLN5655A)
	42-82143C02	CLAMP, cable: 1/4" ID TRN6308A)
	42-82143C03	CLAMP, cable: 1/8" ID (TLN5655A & TRN6308A)

NOTE
For optimum performance, replacement diodes must be ordered by Motorola part number.

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION

TLN5912A Hardware Kit, 2nd Rcvr PL-5080-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		RESISTOR, variable:
R960	18-82515B50	25k ±30%; 1/4 W

NOTE:
Hardware for TLN5912A is listed in the Receiver Hardware Kits Section.

TLN5184A 'Extender" On-Off Switch Kit PL-5081-O

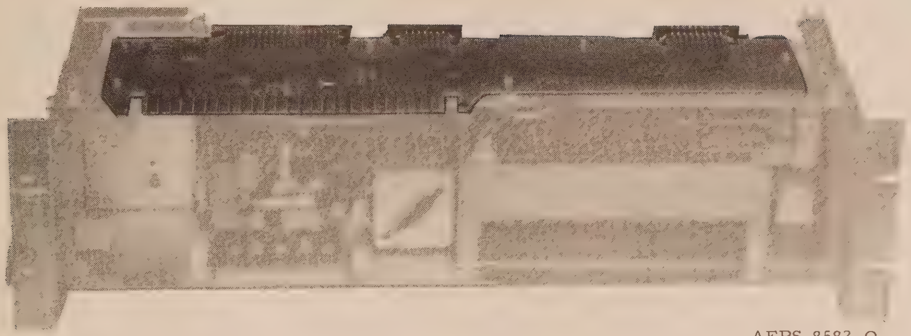
REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		SWITCH, toggle:
S1	40-82085J03	spdt
NON-REFERENCED ITEMS		
	4-1725	WASHER, flat: .266 x .562 x .040; 2 used
	54-84861G01	LABEL: Extender On-Off

TLN5892A Chassis & Hardware Kit PL-5086-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		RESISTOR, variable
[illegible]	18-82515B50	25k ±30%; 1/4 W (shown on Receiver Interconnect Board Schematic)

NOTE:
Hardware for TLN5892A is listed in the Control and Application Manual.

RECEIVER
INTERCONNECT BOARD
MODEL TLN4726B



AEPS-8582-O

1. DESCRIPTION

The receiver interconnect board connects the receiver rf and i-f board and the receiver audio and squelch board to the station 50-conductor intercable.

A number of jumpers are provided to allow use of the board in single and two-receiver stations, and local and remote control stations. Jumper connections for these modes of operations are shown in Table 1.

2. "AND SQUELCH" OPERATION

An optional mode of receiver operation known known as "AND SQUELCH" can be added when desirable. This feature provides "variable PL sensitivity" (tone-coded squelch plus adjustable noise-activated [carrier] squelch).

In this mode, the receiver audio channel is activated when a PL tone is received and the carrier squelch threshold level is exceeded. Since the carrier (noise-activated) squelch circuit sensitivity is adjustable, and since it is one of the controlling factors in the squelching of receiver audio, the operation can be aptly described as "variable PL sensitivity". Thus "AND SQUELCH" denotes both tone-coded squelch and carrier squelch operating simultaneously.

Conversion of the receiver to the "AND SQUELCH" mode of operation requires the addition of certain components to the RECEIVER INTERCONNECT UNIT, and the omission of certain jumpers in both the RECEIVER INTERCONNECT UNIT and the AUDIO & SQUELCH BOARD.

The parts required to convert the receiver to "AND SQUELCH" operation are listed on the back of the schematic diagram.

Refer to the AUDIO & SQUELCH section of this manual for further details relating to "AND SQUELCH" operation.

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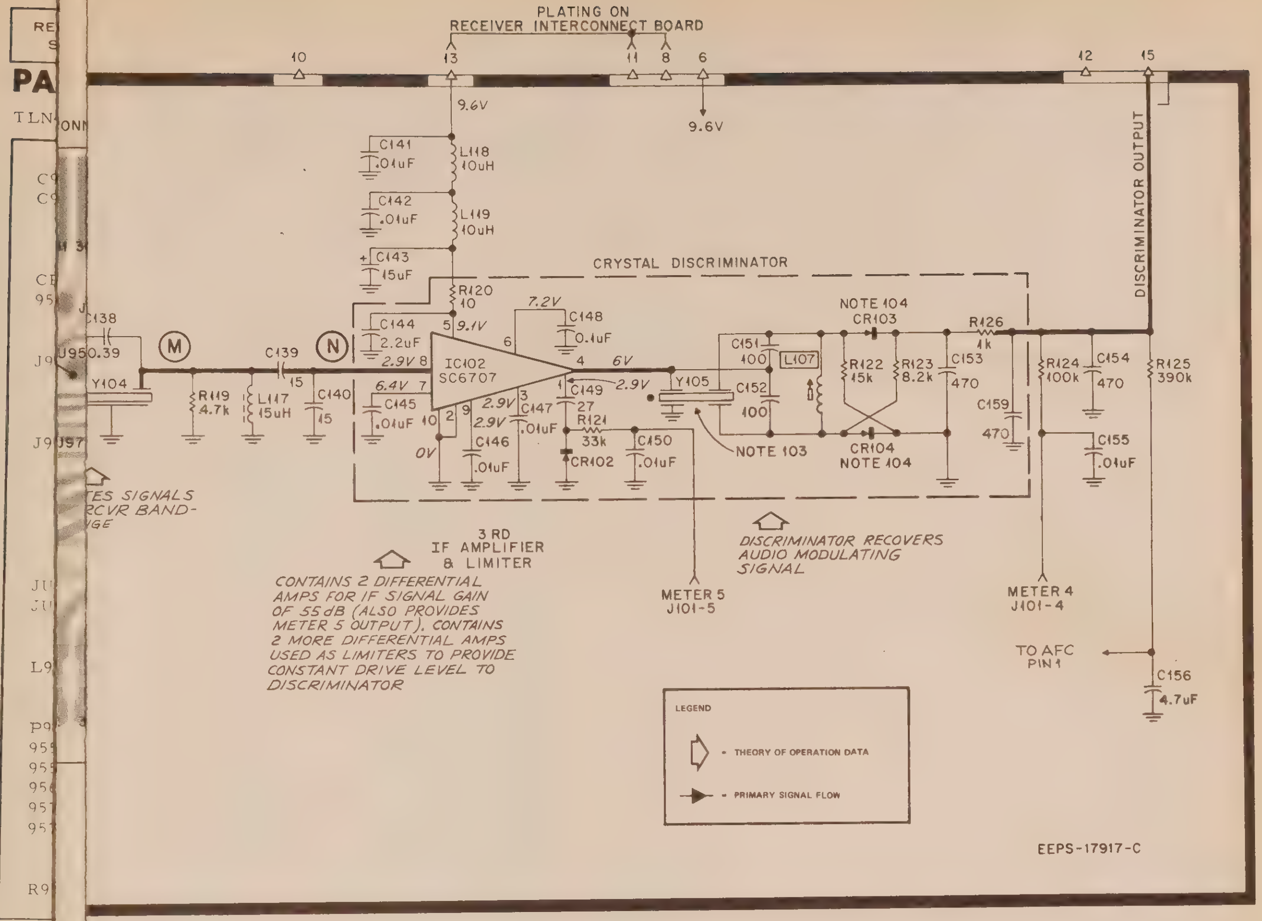
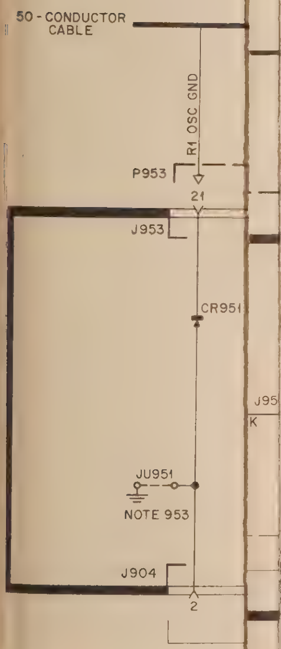
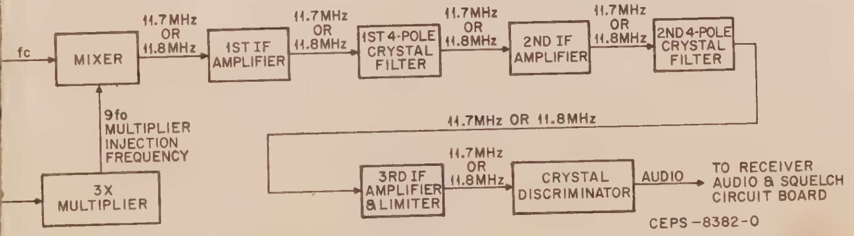
TABLE 1.
JUMPER TABLE

JUMPER JU	SINGLE-RECEIVER STATION		TWO-RECEIVER STATION			
			RECEIVER #1		RECEIVER #2	
	REMOTE CONTROL	LOCAL CONTROL	REMOTE CONTROL	LOCAL CONTROL	REMOTE CONTROL	LOCAL CONTROL
951	NOTE 953					
952	IN	IN	IN	IN	IN	IN
953	IN	OUT	IN	OUT	OUT	OUT
954	IN	IN	OUT	IN	IN	OUT
955	IN	IN	OUT	OUT	IN	IN
956	IN	IN	IN	IN	OUT	OUT
957	*IN	OUT	*IN	OUT	OUT	IN
958	*IN	IN	*IN	IN	OUT	OUT
959	IN	OUT	OUT	OUT	IN	IN
960	IN	IN	IN	IN	OUT	OUT
961	IN	IN	IN	IN	IN	IN
962	IN	IN	IN	IN	IN	IN
963	IN	IN	IN	IN	OUT	OUT
964	IN	OUT	OUT	OUT	IN	IN
965	IN	IN	IN	IN	IN	IN
966	IN	IN	IN	IN	IN	IN
967	IN	IN	IN	IN	IN	IN
968	IN	IN	IN	IN	OUT	OUT
969	OUT	IN	OUT	OUT	OUT	IN
970	IN	IN	IN	IN	IN	OUT
971	OUT	IN	OUT	IN	OUT	IN
972	IN	IN	IN	IN	OUT	OUT
973	OUT	IN	OUT	IN	OUT	OUT
974	OUT	IN	OUT	IN	OUT	IN

* = OUT FOR REPEATER STATIONS


PLATING ON
RECEIVER INTERCONNECT BOARD
10
13
11
8
6
12
15
9.6V
9.6V
C141 .01uF
L118 10uH
C142 .01uF
L119 10uH
C143 15uF
R120 10
CRYSTAL DISCRIMINATOR
DISCRIMINATOR OUTPUT
C138 0.39
M
N
C139 15
C144 2.2uF
5 9.1V
7.2V
C148 0.1uF
6
2.9V 8
IC102 SC6707
4 6V
6.4V 7
2.9V
2.9V
Y104
R119 4.7k
L117 15uH
C140 15
C145 .01uF
10 2 9
3
C147 .01uF
C149 27
1
R121 33k
C146 .01uF
0V
CR102
C150 .01uF
Y105
C151 100
L107
C152 100
NOTE 103
NOTE 104
CR103
R122 15k
R123 8.2k
C153 470
CR104
NOTE 104
R126 1k
C159 470
R124 100k
C154 470
R125 390k
C155 .01uF
3 RD IF AMPLIFIER & LIMITER
CONTAINS 2 DIFFERENTIAL AMPS FOR IF SIGNAL GAIN OF 55dB (ALSO PROVIDES METER 5 OUTPUT). CONTAINS 2 MORE DIFFERENTIAL AMPS USED AS LIMITERS TO PROVIDE CONSTANT DRIVE LEVEL TO DISCRIMINATOR
DISCRIMINATOR RECOVERS AUDIO MODULATING SIGNAL
METER 5 J101-5
METER 4 J101-4
TO AFC PIN 1
C156 4.7uF
LEGEND
- THEORY OF OPERATION DATA
- PRIMARY SIGNAL FLOW
EEPS-17917-C


50 - CONDUCTOR CABLE
R1 OSC GND
P953
21
J953
CR951
JU951
NOTE 953
J904
2


fc
MIXER
11.7MHz OR 11.8MHz
1ST IF AMPLIFIER
1ST 4-POLE CRYSTAL FILTER
2ND IF AMPLIFIER
2ND 4-POLE CRYSTAL FILTER
9fo MULTIPLIER INJECTION FREQUENCY
3X MULTIPLIER
3RD IF AMPLIFIER & LIMITER
CRYSTAL DISCRIMINATOR
AUDIO
TO RECEIVER AUDIO & SQUELCH CIRCUIT BOARD
CEPS-8382-0

REVISIONS PEPS-17915-C

F. BOL	CHANGE	LOCATION
	FROM 6-129887 12K ±5%; 1/4 W TO 6-124A65 4.7K ±5%; 1/4 W	IC102, PIN 8
	FROM 48R869651, M9651 TO 48-869943, M9943	MIXER

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

Receiver RF & IF Board
Schematic Diagram, Circuit Board Detail and
Block Diagram
Motorola No. PEPS-17915-C
8/9/77-UP

HIGH BAND RECEIVER RF & IF BOARD

TABLE 1.
JUMPER TABLE

JUMPER JU	SINGLE-RECEIVER STATION		TWO-RECEIVER STATION			
			RECEIVER #1		RECEIVER #2	
	REMOTE CONTROL	LOCAL CONTROL	REMOTE CONTROL	LOCAL CONTROL	REMOTE CONTROL	LOCAL CONTROL
951	NOTE 953					
952	IN	IN	IN	IN	IN	IN
953	IN	OUT	IN	OUT	OUT	OUT
954	IN	IN	OUT	IN	IN	OUT
955	IN	IN	OUT	OUT	IN	IN
956	IN	IN	IN	IN	OUT	OUT
957	*IN	OUT	*IN	OUT	OUT	IN
958	*IN	IN	*IN	IN	OUT	OUT
959	IN	OUT	OUT	OUT	IN	IN
960	IN	IN	IN	IN	OUT	OUT
961	IN	IN	IN	IN	IN	IN
962	IN	IN	IN	IN	IN	IN
963	IN	IN	IN	IN	OUT	OUT
964	IN	OUT	OUT	OUT	IN	IN
965	IN	IN	IN	IN	IN	IN
966	IN	IN	IN	IN	IN	IN
967	IN	IN	IN	IN	IN	IN
968	IN	IN	IN	IN	OUT	OUT
969	OUT	IN	OUT	OUT	OUT	IN
970	IN	IN	IN	IN	IN	OUT
971	OUT	IN	OUT	IN	OUT	IN
972	IN	IN	IN	IN	OUT	OUT
973	OUT	IN	OUT	IN	OUT	OUT
974	OUT	IN	OUT	IN	OUT	IN

* = OUT FOR REPEATER STATIONS

PARTS LIST

TLN4726B Receiver Interconnect Board PL-3239-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
[illegible]	21-82428B59	CAPACITOR, fixed: .01 uF +80-20%; 200 V
[illegible]	23-84712H09	.15 uF ±20%; 20 V
CR951 thru 954, 957	48-82392B03	SEMICONDUCTOR DEVICE, diode (SEE NOTE) silicon
[illegible]		CONNECTOR, receptacle consists of 9-83011H01 TERMINAL, contact, female; 11 required (mounts on edge of circuit bd.) (for reference only, consists of fingers of plated circuit used as plug contacts for connecting circuit board with a mating receptacle)
JU951 thru JU972		JUMPER (for reference only)
[illegible]	24-82549D03	COIL, RF choke 1 mH
[illegible]	39-10184A30	CONNECTOR, plug female; single-contact (mounts on edge of board)
[illegible]	6-129231	RESISTOR, fixed: 3.3k ±10%; 1/4 W

NOTE

Replacement diodes must be ordered by Motorola part number only for optimum performance.

TLN5060A Optional "And Squelch" Parts PL-2573-A

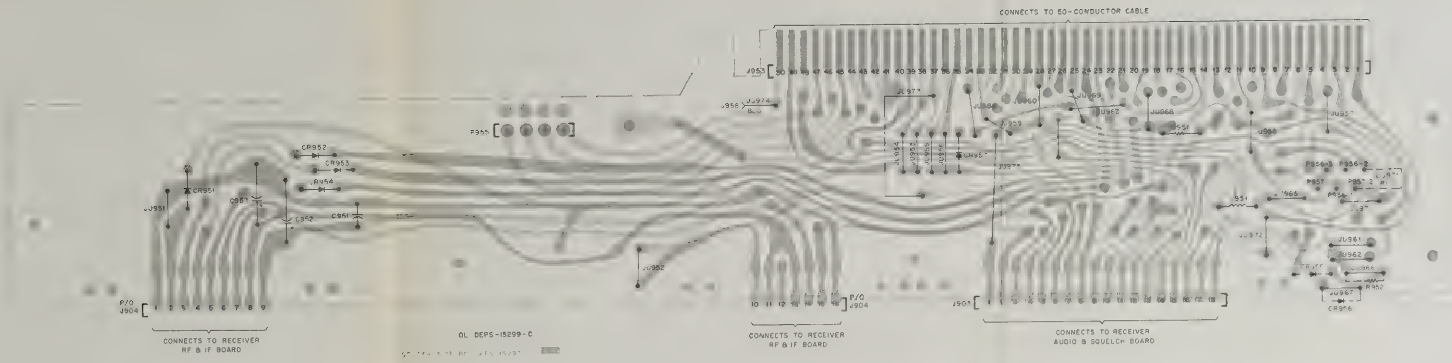
REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR955	48-82392B03	silicon
CR956	48-82392B03	silicon
R952	6-129668	RESISTOR, fixed: 10k ±10%; 1/4 W

TLN5184A "Extender" On-Off Switch Kit PL-5081-O

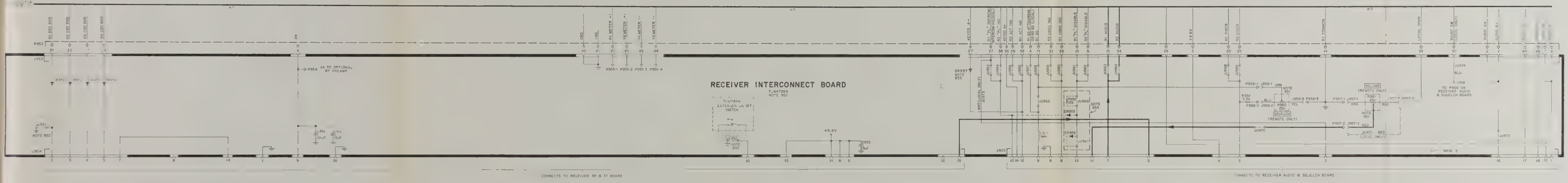
REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
S1	40-82085J03	SWITCH, toggle: spdt
NON-REFERENCED ITEMS		
	4-1725	WASHER, flat: .266 x .562 x .040; 2 used
	54-84861G01	LABEL: Extender On-Off

TLN4727A Receiver Chassis & Hardware Kit
(132-174 MHz only)
TLN4755A Receiver Chassis & Hardware Kit
(25-50 MHz & 72-76 MHz only)
PL-1750-A

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
R960, 961		RESISTOR, variable: Refer to Receiver Interconnect Unit section for parts information
	1-80709B39	SHIELD, receiver (TLN4727A only)
	1-80707B15	SHIELD, receiver (TLN4755A only)
	1-80727B83	CHASSIS ASSEMBLY receiver (TLN4727A only)
	1-80728B56	CHASSIS ASSEMBLY receiver (TLN4755A only)
	1-80728B57	SHIELD, audio & squelch
	26-84434D01	HEATSINK
	36-82629H02	KNOB, control: 2 req'd (VOLUME & SQUELCH)
	41-84144 [illegible]	SPRING, retaining
	55-84300B01	HANDLE: 3 req'd
	2-7005	NUT, hex: 6-32x1/4"x3/32"; 3 req'd
	3-134168	SCREW, tapping: 4-40x1/4"; w/Internal Lockwasher; 6 req'd
	3-134169	SCREW, tapping: 4-40x1/4"; w/External Lockwasher; 1 req'd
	3-135337	SCREW, machine: 6-32x9/16"; "Phillips" flat head; 3 req'd
	3-135715	SCREW, tapping: 6-32x11/16"; w/External Lockwasher; 3 req'd (TLN4727A only)
	4-7666	LOCKWASHER: No. 6 split; 3 req'd
	[illegible]	WASHER, screw retainer: 3 req'd (TLN4727A only)
	[illegible]	GREASE, silicon

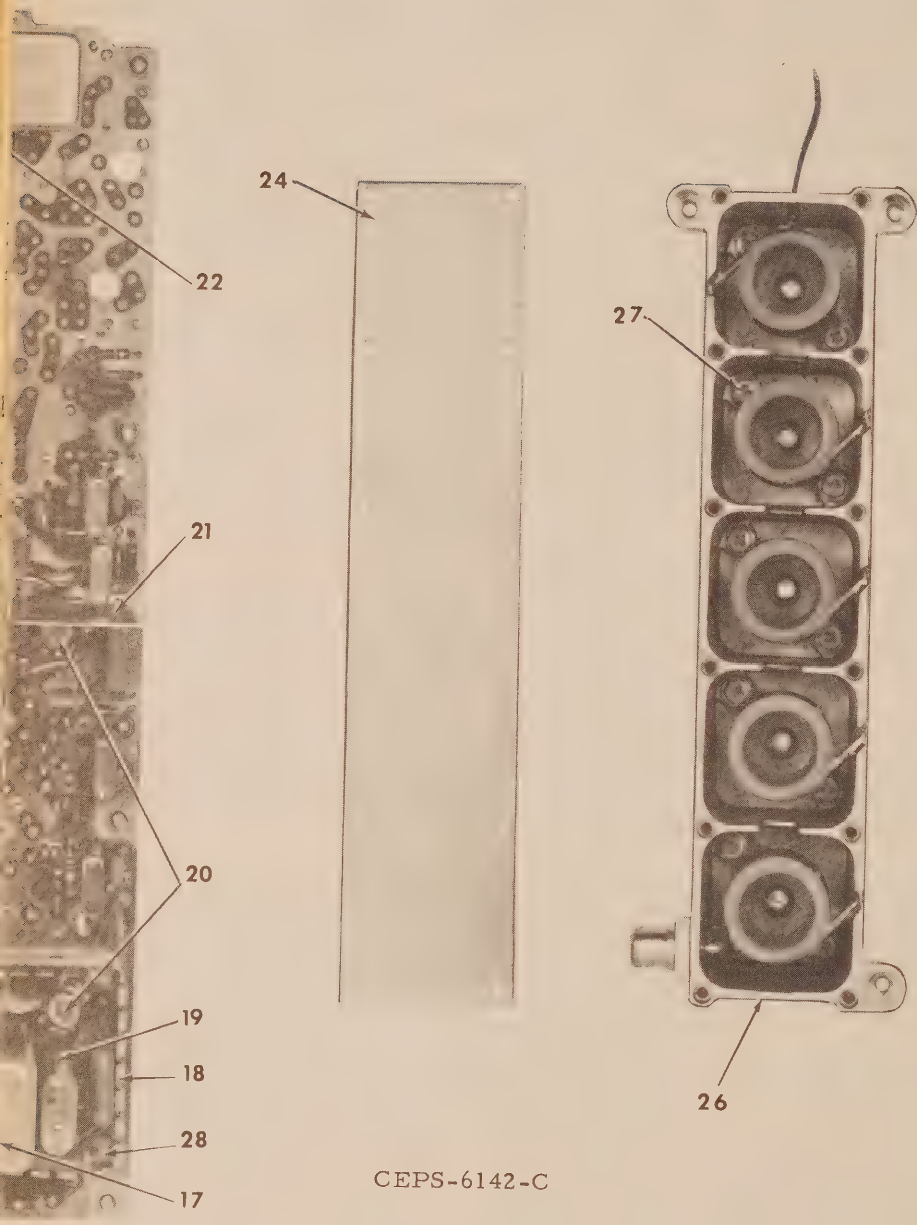

CONNECTS TO 60-CONDUCTOR CABLE
P955
CONNECTS TO RECEIVER RF & IF BOARD
OL DEPS-15299-E
CONNECTS TO RECEIVER RF & IF BOARD
CONNECTS TO RECEIVER AUDIO & SQUELCH BOARD

SHOWN FROM COMPONENT SIDE


RECEIVER INTERCONNECT BOARD
TLN4726B
NOTE 952
TLN5184A EXTENDER ON-OFF SWITCH
CONNECTS TO RECEIVER RF & IF BOARD
CONNECTS TO RECEIVER AUDIO & SQUELCH BOARD
VOLUME (REMOTE ONLY)
SQUELCH (REMOTE ONLY)

RECEIVER INTERCONNECT BOARD

TLN4726B Receiver Interconnect Board
Schematic Diagram and Circuit Board Detail
Motorola No. PEPS-16959-C
2/11/77-UP



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CEPS-6142-C

"MICOR" "SENSITRON" RECEIVER AUDIO & SQUELCH BOARD

MODEL TRN6006A (132-174 MHz, 406-450 MHz
& 450-512 MHz)

MODEL TRN6007A (25-50 MHz & 72-76 MHz)

1. DESCRIPTION

1.1 The audio and squelch board performs two basic functions -- audio amplification and audio squelching. The first two stages in the audio circuitry amplify the signal from the discriminator and provide the proper frequency response. This signal is routed to the line driver module in remote control stations and to the local logic board in local control models. The audio returns through a VOLUME control. The remaining stages in the audio circuitry take the signal returning from the line driver and VOLUME control and provide the necessary frequency response at the speaker. These latter stages also provide the driver required by the final audio amplifiers (located on a separate board) for rated power output. An integrated circuit and one transistor perform all of the above functions.

1.2 The squelch circuitry disables the audio path during intervals between received messages. One integrated circuit performs the necessary detection and squelching functions. Also, in conjunction with the PL decoder and filter board in a PL station, this integrated circuit provides unsquelching when PL signals are received.

2. FUNCTIONAL OPERATION

2.1 GENERAL

2.1.1 The audio signal from the receiver discriminator is routed to the emitter follower (refer to Figure 1.). The emitter follower output is coupled to the SQUELCH control mounted on the receiver chassis or local front panel and also to the line level potentiometer mounted on the audio & squelch board. The signal from this control is next applied to the preamplifier. If JU201 is cut, the signal is first sent through the PL filter for attenuation of the PL tone. The preamplifier output is coupled off the board to the line driver or local-logic board. Audio returning from the line driver or local-logic board is coupled through the appropriate VOLUME control to amplifier Q203. After amplification, the signal is applied to the audio amplification circuits. Here, the signal is raised to a level sufficient to drive the audio final amplifier. These are mounted on a separate board which is secured to the chassis to provide "heat-sinking" capability. The output of the audio power amplifiers is applied to an output transformer which drives a speaker or speaker desk-set transformer (local control stations only).

2.1.2 The signal returned from the SQUELCH control is applied to the squelch section for noise squelch control. Squelch action is achieved by utilizing the inherent characteristic of a discriminator known as noise quieting. An input signal will cause more quieting of noise as the signal level is increased. When a desired level of noise quieting is reached, as determined by the squelch circuitry and the setting of the SQUELCH control, the audio portion of the board and line driver are enabled to allow a message to be heard. In a remote control station, the squelch circuit disables the audio circuitry by shunting a point in the audio signal path to ground and also operating a series switch in the audio signal path of the line driver.

2.1.3 In a local control station, the series path is broken on the local-logic board. In addition, an extra shunt switch is activated on this board and its low resistance is directed back to the audio amplification circuits. This provides extremely quiet operation during periods of no signal.

MOTOROLA INC.
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1301 E. Algonquin Road, Schaumburg, IL 60196

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION

ELECTRICAL PARTS LIST

IMPORTANT

USE ONLY THE FOLLOWING MOTOROLA PART NUMBERS WHEN ORDERING REPLACEMENT PARTS

LEGEND
132-142 MHz

PL-3171-D

107	21D82450B06	0.75
L	[illegible]	30; 200 V, NP0
M	21D82133G58	27, NP0
[illegible]	[illegible]3G58	27, NP0
L	21-83406D46	56; N150
109M	21-83406D44	47, N080
[illegible]	1-83406D46	56, N150
09HH	21-83406D44	47, N080
10L	21-83798B01	100
M	21-84494B03	80
C111	21D82133G37	2 ±0.25 pF, NP0
C112	21D82428B59	.01 uF +80-20%, 200 V
13L	21D83406D36	10 ±0.25 pF, NP0
13M	21D82133G14	7.5 ±0.25 pF, NP0
H	21D83406D36	10 ±0.25 pF, NP0
18	21D82610C44	100; 100 V, N220
119	[illegible]	[illegible]
3		NOT USED
4	21D82450B05	0.24
30	21D82428B59	.01 uF +80-20%, 200 V
4	21D84534B05	160
136	21K868487	1.5 ±0.25 pF, NP0
137	21K868487	1.5 ±0.25 pF, NP0
8	21D82450B07	0.39
139	[illegible]	[illegible]
140	21D82133G19	15
141	21D82428B59	.01 uF +80-20%; 200 V
C142	21D82428B59	.01 uF +80-20%, 200 V
C143	23D83214C02	15 uF ±20%, 25 V
14	23D84762H04	2.2 uF ±20%; 25 V
		.01 uF +80-20%, 200 V
		.01 uF +80-20%, 200 V
		[illegible] uF ±10%

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		SEMICONDUCTOR DEVICE, diode
CR101	48C82139G01	germanium
CR102	48C82139G01	germanium
CR103	48D84616A01	planar hot carrier
CR104	48D84616A01	planar hot carrier
CR105	48C84616A01	planar hot carrier
[illegible]	51R84267A07	[illegible]
	51R84267A07	[illegible]
[illegible]	9C84207B01	[illegible]
[illegible]	9C84135B01	female, single contact; phono type
		COIL, RF: unl stated
L101M	24D84070C01	input
[illegible]	[illegible]	[illegible]
L101HH	24D84409B01	input
L102L	24D84070C03	center
L102M	24D84070C03	center
L102H	24D84409B03	center
L102HH	24D84409B03	center
L103L	24D84070C03	center
L103M	24D84070C03	center
L103H	24D84409B03	center
L103HH	24D84409B03	center
L104L	24D84070C03	center
L104M	24D84070C03	center
L104H	24D84409B03	center
L104HH	24D84409B03	center
L105L	1V80713B52	output
L105M	1V80713B52	output
L105H	1V80709B36	output
L105HH	1V80709B36	output
L106	24E83879G08	IF (GRN)
L107	24-83879G04	discriminator (YEL)
L108	24D84115B03	multiplier (RED)
L109	24D84115B12	multiplier (BRN)
L110	24D83857G07	multiplier (YEL)
[illegible]	[illegible]	[illegible]
L112L	24C84411B02	choke; YEL
L112M	24C84411B02	choke; YEL
L112H	24C84411B02	choke; YEL
L112HH	24C84411B01	choke; WHT
L113	24D82549D25	choke, 10 uH (shielded)
L114	24D82549D24	[illegible]
L115	24D82723H07	choke; 10 uH (VIO)
L116	24D82723H06	choke; 6.2 uH (BLU)
L117	24D82549D24	choke; 15 uH (shielded)
L118	24D82723H07	choke; 10 uH (VIO)
L119	24D82723H07	choke, 10 uH (VIO)
L120	76B83960B01	choke, Ferrite Bead
		TRANSISTOR: (SEE NOTE)
[illegible]	[illegible]	[illegible], FET [illegible]
Q102	48R869652	N-Channel; FET M9652
Q103	48R869658	N-P-N, M9658
		[illegible]
R101	6S127807	33K
R102	6S124A60	3K ±5%
R103	6S129753	100
R104	6S127801	470
R105	6S128689	2.2K
R106	6S129753	[illegible]
R107L	6S129145	82K
R107M	6S129145	[illegible]
R107H	6S129230	12K
R107HH	6S129230	12K
R108	6S129752	[illegible]
R109	6S127800	[illegible]
R110	6S129886	[illegible]
R111	6S1296[illegible]7	[illegible]
R112	[illegible]	[illegible]
[illegible]	6S129887	[illegible]
[illegible]	6S129236	[illegible]

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
R122L, 122M	6S129983	[illegible]
R122H, 122HH	6-124A73	[illegible]
R123L, 123M	6-129236	[illegible]
R123H, 123HH	6S129983	[illegible]
R124	6S129226	[illegible]
R125	6S128682	[illegible]
R126	6S127805	[illegible]
R127	6S129225	[illegible]
		[illegible], quartz
Y101	48D84412B01	11,700 kHz
Y102 thru 104	48D84412B03	11,700 kHz
[illegible]	48D84669B01	11,700 kHz

PL-2384-[illegible]

		[illegible], quartz
Y101 thru 104	48-84412B02	i-f filter
[illegible]	[illegible]	[illegible]ator filter

MECHANICAL PARTS LIST

TLD8270B Series Receiver RF [illegible] PL-3170-O

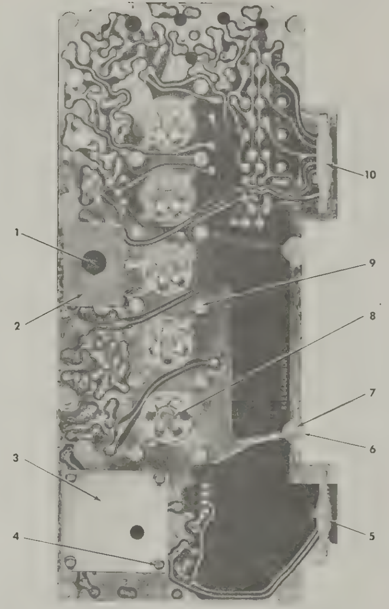
CODE	MOTOROLA PART NO.	DESCRIPTION
1	5B84644B01	GROMMET, rubber
2	26C84642B01	SHIELD (IF)
3	26B84413B01	SHIELD (discriminator)
4	3S138398	SCREW, tapping: 4-24 x 1/2" (4 req'd)
5	55B84300B02	HANDLE (short)
6	42C84284B01	RETAINER, screw: 9 req'd
7	3S136905	LOCKSCREW: No. 4 x 5/16"; 9 req'd
8	41B84410B03	NUT, screw tensioning: 5 req'd.
	or 2-84773E03	NUT, screw tensioning: 5 req'd.
[illegible]	[illegible]	[illegible]REW: No. 4 x 5/16"; 12 req'd
10	55B84300B01	HANDLE (long); 2 req'd
11	29C84028H01	CONTACT, male; 16 req'd
12	26B84250B05	SHIELD; 4 req'd
13	39S10184A24	CONTACT, female
14	26B84250B06	SHIELD
15	14B84540B01	INSULATOR (crystal) 4 req'd
16	26B84414B01	SHIELD; bottom
17	26B84250B08	SHIELD
18	26C84415B01	SHIELD; spring
19	14A84583B01	INSULATOR (crystal)
20	4A49854	WASHER, spacer: 2 req'd
21	[illegible]	SHIELD, barrier
22	39S10184A30	CONTACT
23	29K855943	CONTACT, male; 20 req'd
24	15D84408B01	COVER, RF deck
25	[illegible]	LOCKSCREW: No. 4 x [illegible]; 12 req'd
26	15D84407B01	HOUSING, RF deck
27	3S136926	LOCKSCREW: No. 4-40 x 5/16"; 10 req'd
28	5B84220B01	GROMMET, "Nylon"; 4 req'd

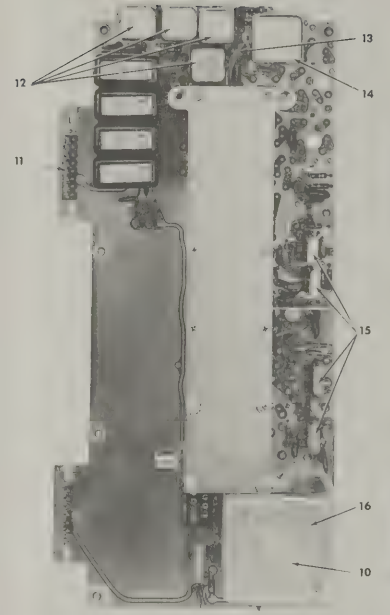
NOTE:

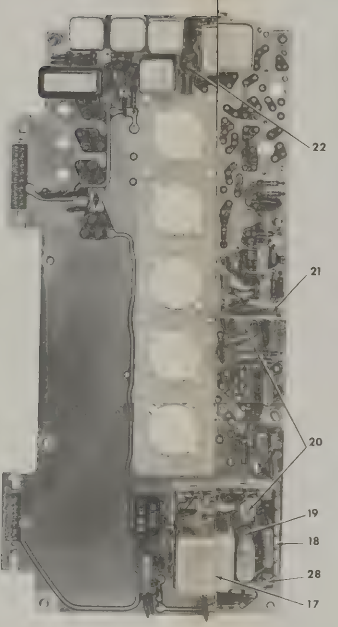
Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.

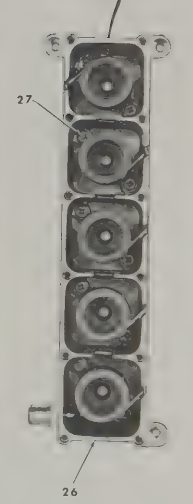
Channel Element PL-2904-O

	K1005A	Receiver control; 132-174 MHz









CEPS-6142-C

"MICOR" "SENSITRON" RECEIVER AUDIO & SQUELCH BOARD

MODEL TRN6006A (132-174 MHz, 406-450 MHz & 450-512 MHz)

MODEL TRN6007A (25-50 MHz & 72-76 MHz)

1. DESCRIPTION

1.1 The audio and squelch board performs two basic functions -- audio amplification and audio squelching. The first two stages in the audio circuitry amplify the signal from the discriminator and provide the proper frequency response. This signal is routed to the line driver module in remote control stations and to the local logic board in local control models. The audio returns through a VOLUME control. The remaining stages in the audio circuitry take the signal returning from the line driver and VOLUME control and provide the necessary frequency response at the speaker. These latter stages also provide the driver required by the final audio amplifiers (located on a separate board) for rated power output. An integrated circuit and one transistor perform all of the above functions.

1.2 The squelch circuitry disables the audio path during intervals between received messages. One integrated circuit performs the necessary detection and squelching functions. Also, in conjunction with the PL decoder and filter board in a PL station, this integrated circuit provides unsquelching when PL signals are received.

2. FUNCTIONAL OPERATION

2.1 GENERAL

2.1.1 The audio signal from the receiver discriminator is routed to the emitter follower (refer to Figure 1.). The emitter follower output is coupled to the SQUELCH control mounted on the receiver chassis or local front panel and also to the line level potentiometer mounted on the audio & squelch board. The signal from this control is next applied to the preamplifier. If JU201 is cut, the signal is first sent through the PL filter for attenuation of the PL tone. The preamplifier output is coupled off the board to the line driver or local-logic board. Audio returning from the line driver or local-logic board is coupled through the appropriate VOLUME control to amplifier Q203. After amplification, the signal is applied to the audio amplification circuits. Here, the signal is raised to a level sufficient to drive the audio final amplifier. These are mounted on a separate board which is secured to the chassis to provide "heat-sinking" capability. The output of the audio power amplifiers is applied to an output transformer which drives a speaker or speaker desk-set transformer (local control stations only).

2.1.2 The signal returned from the SQUELCH control is applied to the squelch section for noise squelch control. Squelch action is achieved by utilizing the inherent characteristic of a discriminator known as noise quieting. An input signal will cause more quieting of noise as the signal level is increased. When a desired level of noise quieting is reached, as determined by the squelch circuitry and the setting of the SQUELCH control, the audio portion of the board and line driver are enabled to allow a message to be heard. In a remote control station, the squelch circuit disables the audio circuitry by shunting a point in the audio signal path to ground and also operating a series switch in the audio signal path of the line driver.

2.1.3 In a local control station, the series path is broken on the local-logic board. In addition, an extra shunt switch is activated on this board and its low resistance is directed back to the audio amplification circuits. This provides extremely quiet operation during periods of no signal.

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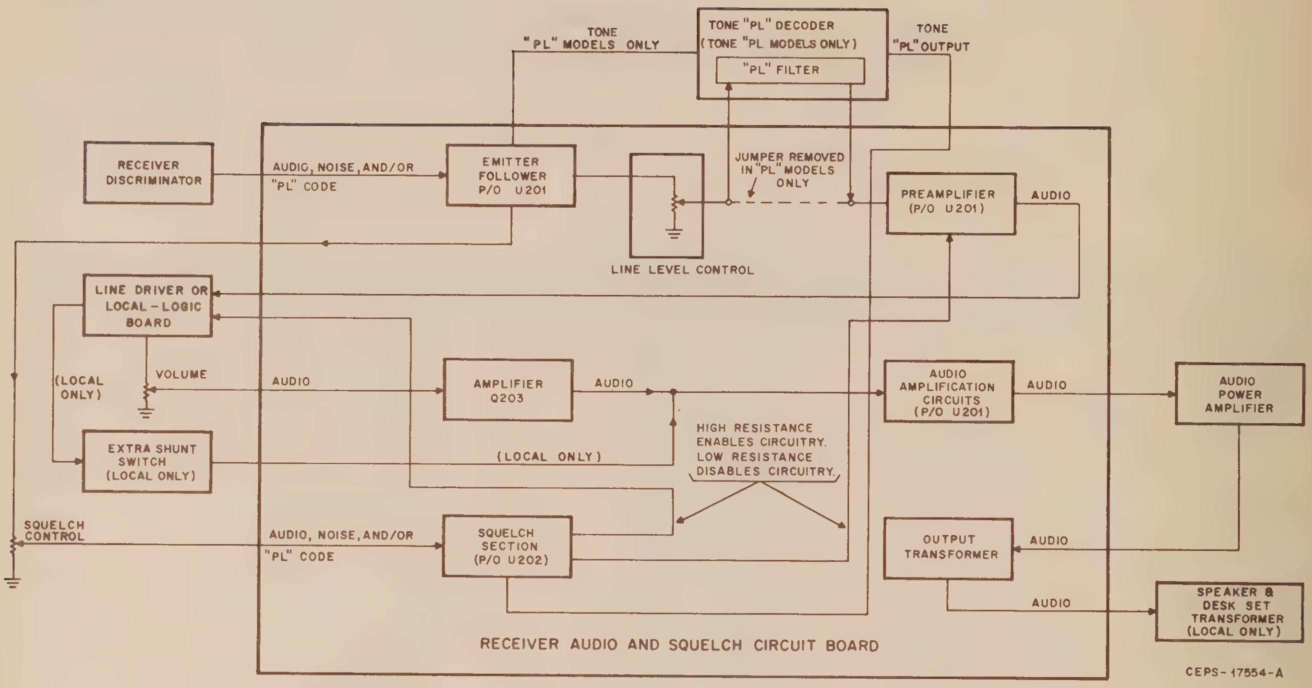

TONE "PL" MODELS ONLY
TONE "PL" DECODER (TONE "PL" MODELS ONLY)
"PL" FILTER
TONE "PL" OUTPUT
RECEIVER DISCRIMINATOR
AUDIO, NOISE, AND/OR "PL" CODE
EMITTER FOLLOWER P/O U201
JUMPER REMOVED IN "PL" MODELS ONLY
PREAMPLIFIER (P/O U201)
AUDIO
LINE LEVEL CONTROL
LINE DRIVER OR LOCAL-LOGIC BOARD
(LOCAL ONLY)
VOLUME
AUDIO
AMPLIFIER Q203
AUDIO
AUDIO AMPLIFICATION CIRCUITS (P/O U201)
AUDIO
AUDIO POWER AMPLIFIER
HIGH RESISTANCE ENABLES CIRCUITRY. LOW RESISTANCE DISABLES CIRCUITRY.
EXTRA SHUNT SWITCH (LOCAL ONLY)
(LOCAL ONLY)
SQUELCH CONTROL
AUDIO, NOISE, AND/OR "PL" CODE
SQUELCH SECTION (P/O U202)
OUTPUT TRANSFORMER
AUDIO
AUDIO
SPEAKER & DESK SET TRANSFORMER (LOCAL ONLY)
RECEIVER AUDIO AND SQUELCH CIRCUIT BOARD
CEPS-17554-A

Figure 1.
Audio and Squelch Block Diagram

2.1.4 Upon completion of a received message, audio shut-off is either immediate or automatically delayed 150 milliseconds, depending upon the signal level of the previously received rf carrier. A strong signal produces the immediate shut-off and prevents an annoying, loud "squelch tail" burst from being heard. Weak signals (signals that produce less than 20 dB noise quieting) produce the long shut-off delay and prevent a message from being chopped under "flutter" conditions. Since the received signal level must be low for the long turn-off delay to occur and the "squelch tail" level is comparable to that of the received signal, the "squelch tail" is not annoying.

2.2 EMITTER FOLLOWER CIRCUIT

2.2.1 The emitter follower circuit provides a low impedance output which isolates the high impedance discriminator output from the following squelch and audio circuitry.

2.2.2 The output of the discriminator is capacitively coupled to the emitter follower input at U201-1 and may consist of noise and audio signals. The output of the emitter follower at U201-2 is routed through C207 to the SQUELCH control and also to the line level control.

2.3 PREAMPLIFIER CIRCUIT

This circuit amplifies the low-level audio signal to provide the drive necessary for proper line driver operation. In addition, a negative feedback network (C208 and C209) provides the necessary frequency response characteristics for phone line operation. In PL stations, jumper JU202 is cut and the negative feedback is provided by C209 only. The network of R210 and C210 provides additional frequency response shaping.

2.4 AMPLIFIER CIRCUIT

Transistor Q203 increases the signal level from the line driver or local-logic board to the level required by the audio amplification circuits. Jumper JU203 is out when the equipment leaves the factory. The gain of Q203 is sufficient to drive the audio amplification circuits if the signal strength from the line driver or squelch gate exceeds -10 dBm. With a signal strength below this level, it is advisable to put in JU203 which increases the gain of Q203. The RC network at the input to this stage provides additional frequency response shaping required at the speaker.

2.5 AUDIO AMPLIFICATION CIRCUIT

2.5.1 The signal from amplifier Q203 is applied to the differential amplifier through capacitors C211 and C213. In a local station, the extra shunt switch on the local-logic board is connected to the junction of C211 and C213.

2.5.2 The differential amplifier output provides the drive for the complementary amplifier. Resistors R221 and R220 form a voltage divider biasing the differential amplifier at one-half of the supply voltage. Undesirable transient voltages are eliminated by capacitor C212.

2.5.3 Final audio amplification on the audio and squelch board occurs in the complementary amplifier. These stages provide the drive for the audio power amplifiers which are mounted on a separate board. The complementary amplifier emitter resistors (R218 and R219) are not included in U201 because of their high heat dissipation requirements.

2.5.4 Audio returned to the audio and squelch board (from the audio power amplifier transistors) is applied to the output transformer primary windings. This transformer consists of four windings -- two input primaries, an output secondary, and a feedback secondary. The output secondary winding couples audio power to an external 8-ohm speaker which can be driven with up to 10 watts at less than 5% distortion. Negative feedback from the output transformer winding through C216 and across R211 gives 6 dB per octave de-emphasis (roll-off) to the audio which has been pre-emphasized 6 dB per octave in the transmitter. Below 300 Hz, feedback from R213 and across C215 increases giving low frequency de-emphasis. Capacitor C238 rolls off the high frequency gain of the amplifier to prevent high frequency oscillation. Capacitors C223 and C224, C240, C241, and C242 are rf bypass capacitors that shunt stray rf on the audio A+ and audio A- lines to ground. In local operation the output secondary winding couples audio power to a 16-ohm speaker and an autotransformer. This transformer will drive up to six local desk sets.

2.6 NOISE ACTIVATED SQUELCH CIRCUIT

2.6.1 Squelch Input Circuit

2.6.1.1 The input signal from the SQUELCH control may consist of audio and noise. An input shaping network precedes U202 and passes high frequencies while attenuating low frequencies. Allowing the high frequencies to pass eliminates the effect of voice and results in more sensitive threshold squelch action.

2.6.1.2 The first amplifier and limiter is driven into limit by its input signal and prevents audio from squelching (disabling) the audio channel on voice signals. Amplified, limited noise is then passed through a coupling network to the second amplifier. This coupling network is also a high pass filter which further attenuates voice and tone signals to the second amplifier.

2.6.1.3 The second amplifier amplifies the noise signal and applies it through an RC coupling network to the detector. Capacitor C233 and C234 form another high pass filter that attenuates the low frequencies. Capacitor C234 is used to produce a peak-to-peak detector action from the noise detector, and thus, generate twice the output voltage of a peak detector. This capacitor does not affect frequency response.

2.6.2 Detector and Switching Circuits

2.6.2.1 The detector output level is a function of received signal strength and the setting of the SQUELCH control. The detector develops the dc output voltage across filter capacitor C235. The lowest dc output voltage corresponds to a no signal input (maximum noise) condition. The output voltage increases as the received rf carrier signal level increases (noise decreases).

2.6.2.2 The primary function of the detector output, however, is the control of shunt switching. This is done by applying the detector output to three squelch control circuits simultaneously:

-- long "squelch-tail" circuit

-- long "squelch-tail" defeat switch

-- carrier squelch switching logic

2.6.2.3 With no received rf carrier signal (maximum noise condition), the long "squelch tail" circuit and long "squelch tail" defeat switch are "off" and the carrier squelch switching logic is "on". The audio channel is subsequently disabled unless the squelch control logic is overridden by other circuitry.

2.6.2.4 As the input signal level increases (noise decreases), the detector output voltage increases. A detector output voltage above 2.8 volts dc results in enabling of the long "squelch tail" circuit. The long "squelch tail" circuit produces a voltage at U202-12 of 5.5 volts dc; this voltage causes the carrier squelch switching logic circuit to turn "off" and thereby enables the audio channel. Capacitor C236 and resistor R235 provide a rapid-rise, slow-decay time constant to the voltage applied to the carrier squelch switching logic circuit. This permits a weak signal to immediately enable the audio channel, yet delays the audio channel shut-off if the signal is in a "flutter" condition. The voltage necessary to enable the carrier squelch switching logic is approximately 3.8 volts dc.

2.6.2.5 A voltage greater than 5 volts dc at the detector output (rf carrier signal level that produces 20 dB quieting or better with the SQUELCH control set at threshold), turns on the long "squelch tail" defeat switch. This disables the long "squelch tail" circuit and the 150 millisecond delay function. Audio channel disabling now occurs immediately after the rf carrier disappears.

2.6.3 Squelch Output Circuit

The squelch control logic circuit directly controls the shunt switches.

2.6.3.1 The output of the squelch control logic circuit depends upon the output of the preceding carrier squelch switching logic circuit. With the carrier squelch switching logic circuit "off", the squelch control logic circuit will turn off the shunt switches, allowing a message to be heard. If the carrier squelch switching logic is "on", the squelch control logic circuit will turn on the shunt switches, disabling the audio channel, and activating the series switches in the line driver or local-logic board. Capacitor C237, connected to U202-10, slows the turn-off of the shunt switches to "soften" what would otherwise be an annoyingly abrupt turn-on of the audio. This same point (U202-10) supplies a digital output voltage that can be used as an indicator that the receiver is unsquelched (audio channel enabled).

2.6.3.2 Two additional functions that may affect the squelch control logic output are associated with "Private-Line" operation. PL disable (U202-14) may be either shorted to ground or open. When an open is present at U202-14 (PL disabled), a received signal with or without a PL code will be heard from the speaker. When at ground potential (PL enabled), the output of the carrier squelch switching logic circuit is inhibited. When the proper PL code is received, a positive 9.5 volts dc from the PL decoder board to U202-8 turns off the squelch control logic circuit which turns off the shunt switches and allows a message to be heard. Jumper JU204 is normally in the circuit and is only cut when a field modification is made. The cutting of this jumper and associated modifications on the receiver interconnect board will provide "AND-SQUELCH" operation, changing the PL squelch circuitry from fixed sensitivity operation to variable sensitivity operation. Under this mode of operation, the SQUELCH control will affect the squelch sensitivity.

2.6.3.3 Audio disabling is performed by shunting the audio circuit to ground through a low impedance path and also by the operation of a series switch in the line driver or local-logic board. When the solid state shunt switch is turned "on" (U202-7), signals developed across R236 are shunted to ground. This prevents any signals from being heard at the speaker. Acting in tandem with the first shunt switch, the second shunt switch output is routed to the line driver or local-logic board and enables a set of switches on either of the boards. In a remote control system, this breaks the audio path and prevents audio from appearing on the 600-ohm line. In a local control system, these series switches also break the audio path, thus preventing any audio or hum and noise from reaching the speaker.

3. MAINTENANCE

3.1 GENERAL

This section of the manual provides maintenance shop type procedures for the audio and squelch board. It assumes that preliminary tests have already localized the trouble to this board. These bench tests include procedures for testing and troubleshooting, including integrated circuit check-out.

NOTE

The audio and squelch board must be installed in a station for testing to provide the necessary power and ground connections.

3.2 PERFORMANCE TESTS

The performance tests may be used for troubleshooting to isolate the point of abnormal operation. They may also be used after repair to assure that the board is operating properly before it is returned to service.

3.2.1 Audio Amplification

3.2.1.1 Specifications

The audio section of the audio and squelch board combined with the separate audio power amplifier transistors will provide at least 10-watts (5 watts local) audio output at less than 5 per cent distortion from a 3.0 kHz deviated, 1 kHz modulated on-frequency signal applied to the station antenna receptacle.

3.2.1.2 Procedure

Step 1. Replace the speaker with an 8-ohm, 15-watt non-inductive resistor. In local control stations, disconnect the autotransformer.

Step 2. Set the SQUELCH control fully counterclockwise (unsquelched). "Private-Line" stations must also be PL disabled.

Step 3. Connect an rf signal generator to the station antenna receptacle and adjust it to the receiver frequency.

Step 4. Adjust the signal generator for 1000-microvolt output, modulated with 1000-Hz tone at ±5.0 kHz deviation.

Step 5. Connect an AC voltmeter to pin J903-7 at the receiver interconnect board.

Step 6. Adjust the line level control R203 for 175 mV ac rms.

Step 7. Reduce the deviation to ±3.0 kHz.

Step 8. Connect an AC voltmeter across the 8-ohm resistor.

Step 9. Adjust the VOLUME control until 9.0 volts ac rms is read on the ac voltmeter (this represents 10 watts).

Step 10. Measure distortion at 10-watts audio power output. It should be less than 5 per cent.

3.2.2 Squelch Control

3.2.2.1 Specifications

3.2.2.1.1 The squelch section of the receiver audio and squelch board shall enable the audio section when an rf signal level greater than 6 dB noise quieting (one-half the discriminator output level with no signal input) is applied to the receiver with the SQUELCH control set at threshold. When the signal is removed from the station, the audio channel shall become disabled after approximately 150 milliseconds. When an input signal greater than that required for approximately 20 dB noise quieting is removed from the station, the audio channel shall become disabled immediately.

3.2.2.1.2 When the SQUELCH control is turned fully clockwise (tight squelch) an input signal that produces about 20 dB noise quieting shall be required to enable the audio channel.

3.2.2.1.3 The squelch section shall inhibit audio output when no input signal is received.

3.2.2.1.4 In "Private-Line" stations, the squelch section of the receiver's audio and squelch board shall perform as described in paragraphs 3.2.2.1.1, .2, and .3 while the radio set is PL disabled.

3.2.2.1.5 In PL operation, the squelch section shall inhibit audio output when the proper PL code is not received, regardless of the input signal strength.

3.2.2.2 Procedure

3.2.2.2.1 Carrier Squelch Stations

Step 1. Turn the station on and adjust the SQUELCH control clockwise from the full counterclockwise position until the receiver just quiets (threshold squelch).

Step 2. Measure the resistance of U202-6 and -7 with reference to ground. Both pins should be less than 1000 ohms.

NOTE

Erroneous readings will be obtained in resistance measurements if the voltage between the ohmmeter probes exceeds approximately 5.0 volts dc.

Step 3. Connect a signal generator to the station antenna receptacle and adjust it to the receiver frequency. Modulate the generator output with a 1000-Hz tone at ±3.0 kHz deviation.

Step 4. Increase the signal generator output slowly until the receiver just unsquelches. Remove the modulation from the signal generator. Unsquelching should occur at a generator output that produces 6 dB noise quieting, or less.

Step 5. Measure the resistances of U202-6 and -7 with reference to ground. Both pins should be greater than 200,000 ohms.

Step 6. Increase the signal generator output until approximately 12 dB noise quieting is obtained. Remove the rf signal from the station input either by turning off the signal generator or by using a relay in series with the signal generator output. A long "squelch tail" should occur. If a calibrated, triggered sweep oscilloscope is available for measurement, the duration of the "squelch tail" should be approximately 150 milliseconds as measured at the speaker.

Step 7. Increase the signal generator output to produce 30 dB noise quieting. Turn off the rf signal and note the "squelch tail" duration. It should be no more than a "click". The duration should be less than 10 milliseconds.

Step 8. Turn the SQUELCH control fully clockwise (tight squelch).

Step 9. Adjust the signal generator output level until the station just unsquelches. Unsquelching should occur at a generator output that produces approximately 20 dB noise quieting.

3.2.2.2.2 "Private-Line" Stations

Step 1. Disable the PL circuitry.

Step 2. Perform previously described carrier squelch station procedure.

Step 3. Return the station to PL operation. On stations using "AND" squelch operation, also turn the SQUELCH control fully counterclockwise during this test.

Step 4. Vary generator output between minimum output and 1000 microvolt output while checking the resistances of U202-6 and -7 with reference to ground. Both resistances should remain at less than 1000 ohms.

Step 5. Modulate the on-frequency generator output with a PL code for ±0.5 to ±1 kHz deviation and 1000-Hz tone for ±3.0 kHz overall deviation.

Step 6. Increase the signal generator output slowly until the receiver just unsquelches. Unsquelching should occur at a generator output that produces 6 dB quieting, or less.

3.3 TROUBLESHOOTING

3.3.1 Check Input Voltages

A malfunction in the audio and squelch operation may be due to the loss of dc input voltages which can be caused by this board or another section of the station. Since there are only two input voltages applied to this board, it is advantageous to verify their presence before beginning extensive troubleshooting.

P903-1, -4	+9.6 V dc in respect to chassis
P903-16	Audio A+ (approximately +13.6 V dc in respect to A-)

In a negative ground system, audio A- is at chassis potential. In a positive ground system, audio A+ is at chassis potential.

3.3.2 Isolating Defective Components

If tests indicate abnormal performance, a logical troubleshooting procedure should be followed to isolate the defective component efficiently. Results of performance tests usually localize the malfunction to one or two stages. The accompanying troubleshooting chart summarizes these results in a logical sequence. A few waveforms, voltage and resistance checks in the suspected circuit should readily isolate the defective component when compared with those on the schematic diagram.

3.3.3 Troubleshooting Integrated Circuits

Integrated circuits (IC's) are very reliable components and should not be replaced until all checks have proven definitely that the IC is the defective component. Make sure that the external components in the circuit are normal. The IC's on the audio and squelch board may be checked by dc voltage measurements although signal tracing with an oscilloscope is preferred.

3.3.4 Stage Gain Measurements

3.3.4.1 Squelch Circuitry

3.3.4.1.1 This troubleshooting procedure may be used to isolate a squelch malfunction occuring before the detector to a specific stage. The test is performed by injecting an ac signal at the input to the squelch circuitry and noting results obtained with an ac voltmeter. Most accurate results are obtained by taking dB gain and loss measurements between points as illustrated in Figure 2. Individual point voltage checks may also be used to quickly verify proper squelch input circuitry operation but this is not an adequate test to prove the circuitry is defective (refer to the following table and Figure 2). Tolerance addition may cause increasing variation from the typical readings in the table as readings are taken further from the injected signal point.

3.3.4.1.2 The following procedure may be used for loss and gain or signal level measurements while injecting a 3 kHz or 30 kHz signal. In "Private-Line" radios, PL operation will not affect this test.

Step 1. Turn the VOLUME control fully counterclockwise (off), or to a comfortable listening level, if desired.

Step 2. Turn the SQUELCH control fully clockwise (squelched) and turn the station on.

Step 3. Inject a 1000-microvolt, on-channel signal at the station antenna receptacle. This "quiets" the discriminator output and prevents erroneous test readings.

Step 4. Inject a 3 kHz, 10 millivolt rms signal at the receiver audio & squelch board at P903-9.

Step 5. Take loss and gain measurements or signal level measurements as required.

Step 6. Repeat the preceding test using a 30 kHz signal in place of the 3 kHz signal in step 4.

3.3.4.2 Audio Circuitry

AC voltage measurements and waveforms are given where applicable on the schematic diagram. Refer to this diagram for pertinent information when taking audio stage gain measurements.

AC VOLTMETER CONNECTED TO U202-PIN	AC VOLTMETER READING WITH 3 kHz SIGNAL INPUT (mV)	AC VOLTMETER READING WITH 30 kHz SIGNAL INPUT (mV)
15	3.5	9.5
1	40	110
2	7	85
3	80	950
4	24	750

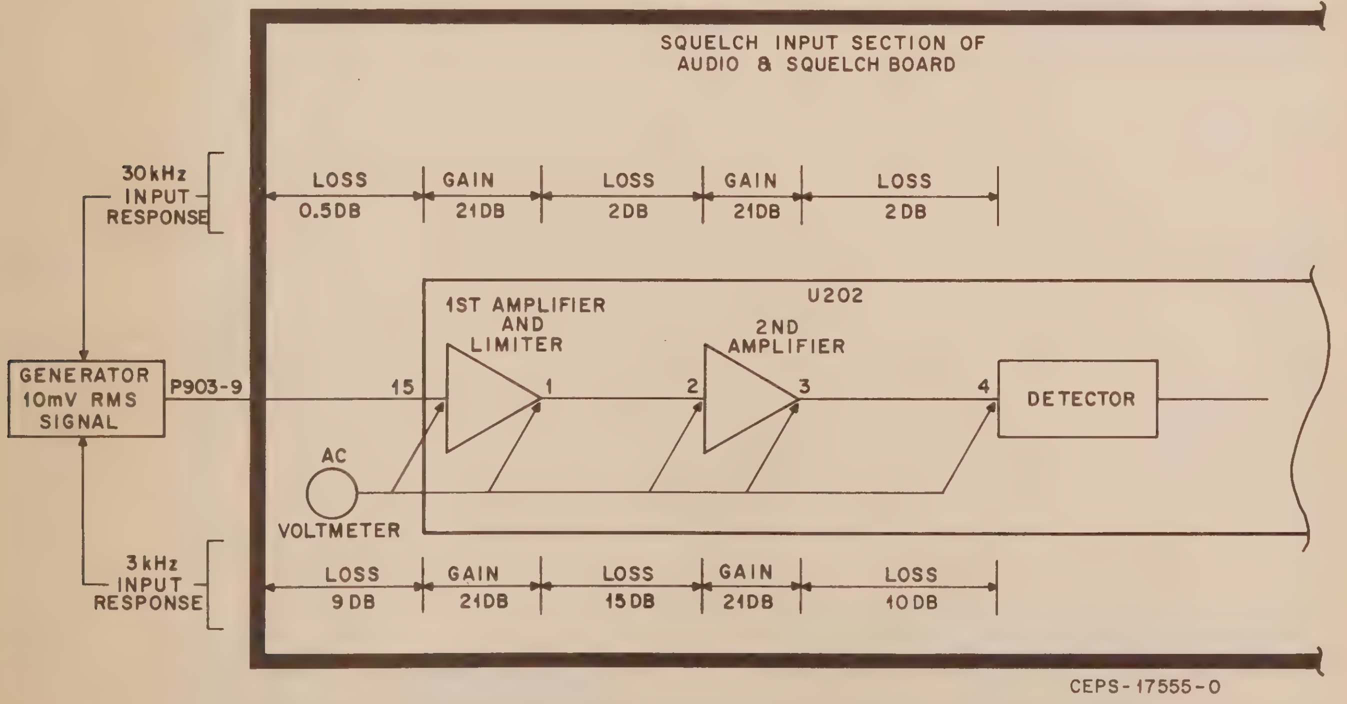
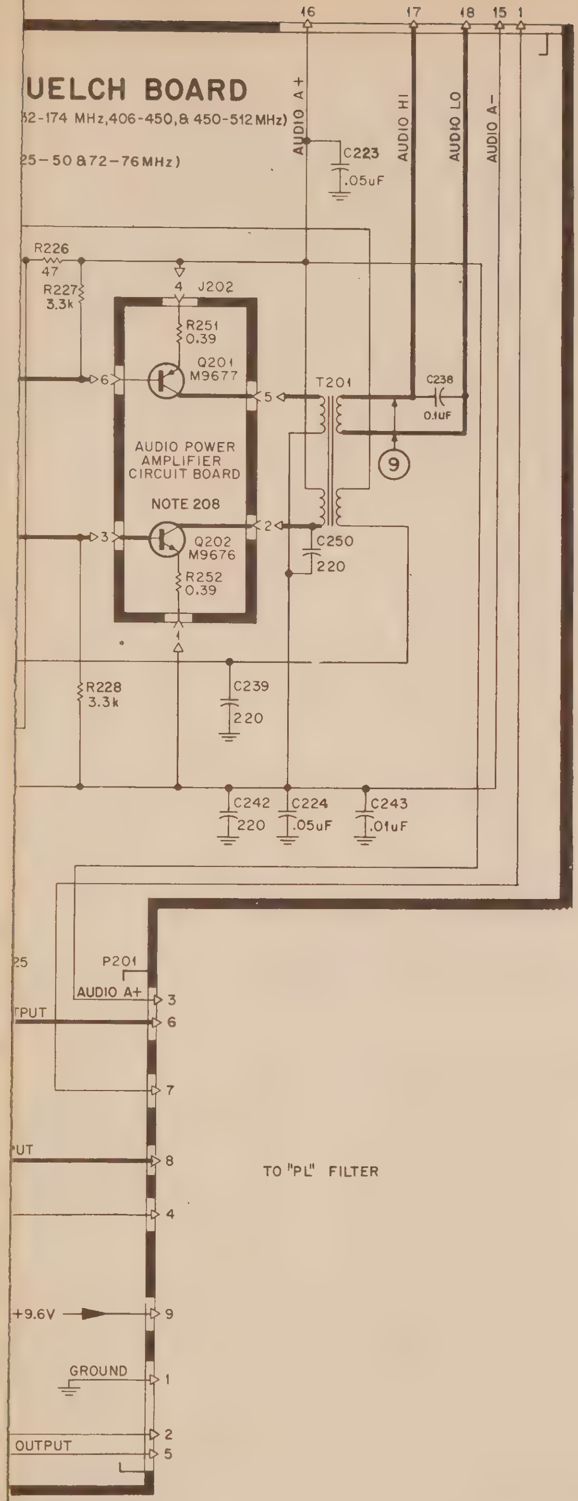

SQUELCH INPUT SECTION OF AUDIO & SQUELCH BOARD
30kHz INPUT RESPONSE
LOSS 0.5DB
GAIN 21DB
LOSS 2DB
GAIN 21DB
LOSS 2DB
U202
1ST AMPLIFIER AND LIMITER
2ND AMPLIFIER
GENERATOR 10mV RMS SIGNAL
P903-9
15
1
2
3
4
DETECTOR
AC VOLTMETER
3kHz INPUT RESPONSE
LOSS 9DB
GAIN 21DB
LOSS 15DB
GAIN 21DB
LOSS 10DB
CEPS-17555-0

Figure 2.
Squelch Circuitry Stage Gain Measurements


UELCH BOARD
32-174 MHz,406-450,& 450-512 MHz)
25-50 & 72-76 MHz)
16
17
18
15
1
AUDIO A+
AUDIO HI
AUDIO LO
AUDIO A-
C223
.05uF
R226
47
R227
3.3k
4
J202
R251
0.39
Q201
M9677
6
5
T201
C238
0.1uF
9
AUDIO POWER AMPLIFIER CIRCUIT BOARD
NOTE 208
3
2
Q202
M9676
R252
0.39
C250
220
R228
3.3k
C239
220
C242
220
C224
.05uF
C243
.01uF
P201
AUDIO A+
25
TPUT
UT
+9.6V
GROUND
OUTPUT
7
8
4
9
1
TO "PL" FILTER

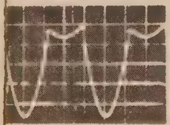
NOTES:

201. +5.6 VOLTS WHEN THRESHOLD SIGNAL JUST OPENS SQUELCH (I.E., APPROXIMATELY 6 dB QUIETING SIGNAL WITH SQUELCH CONTROL AT THRESHOLD).
202. WHERE MORE THAN ONE VOLTAGE READING APPEARS:
     USQ= RECEIVER UNSQUELCHED
     FSQ= RECEIVER FULLY SQUELCHED
203. VOLTAGE MEASURED WITH RESPECT TO A-.
204. VOLTAGE MEASURED WITH RESPECT TO A+.
205. VOLTAGES AT U201-6 AND -7 MUST BE THE SAME VALUE.
206. UNLESS OTHERWISE STATED:
     CAPACITOR VALUES ARE IN PICOFARADS.
207. UNLESS OTHERWISE STATED, VOLTAGE MEASUREMENTS ARE FOR DC VOLTAGES ± 10% MEASURED WITH AN 11 MEGOHM INPUT RESISTANCE VOLTMETER WITH RESPECT TO CHASSIS GROUND.
208. AUDIO POWER AMPLIFIER IS NOT PART OF AUDIO & SQUELCH BOARD.
209. JUMPER JU204 MUST BE REMOVED FOR "AND SQUELCH" OPERATION. (SEE "RECEIVER INTERCONNECT UNIT" SECTION). SEE JUMPER TABLE FOR JUMPER USE.

JUMPER TABLE

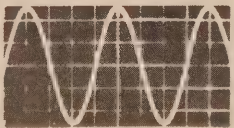
JUMPER	USE
JU201	CONNECTED IN CARRIER SQUELCH STATIONS.
JU202	CONNECTED IN CARRIER SQUELCH STATIONS.
JU203	CONNECTED TO PROVIDE 10 WATTS AUDIO AT SPEAKER WITH LINE LEVELS OF -10 dBM OR LESS (REMOTE CONTROL STATIONS ONLY).
JU204	CUT FOR "AND SQUELCH"

⑧



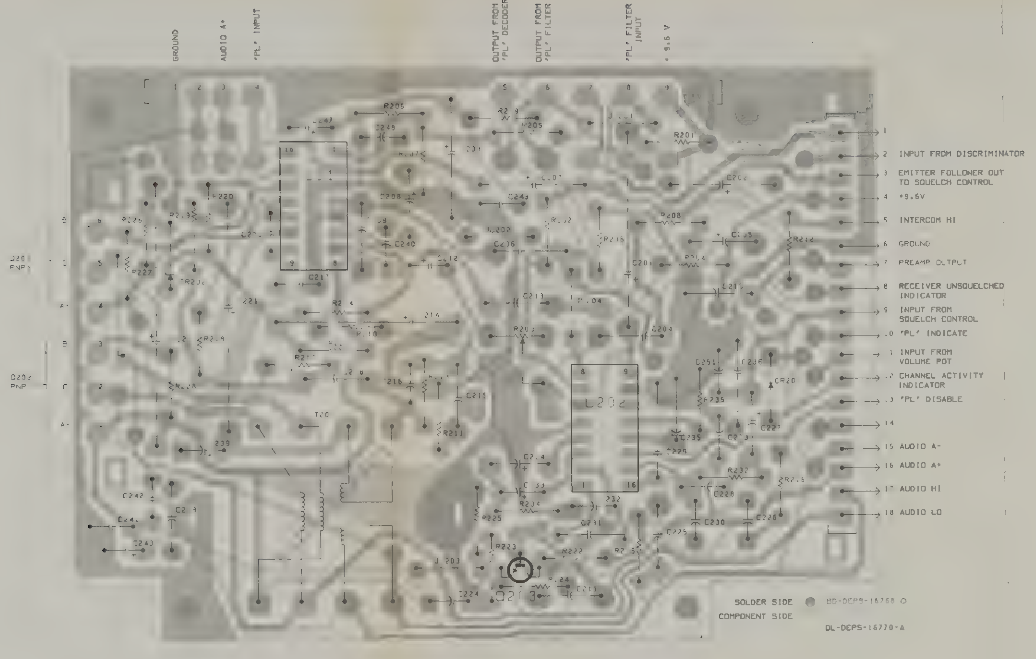
.5 V/DIV.

⑨

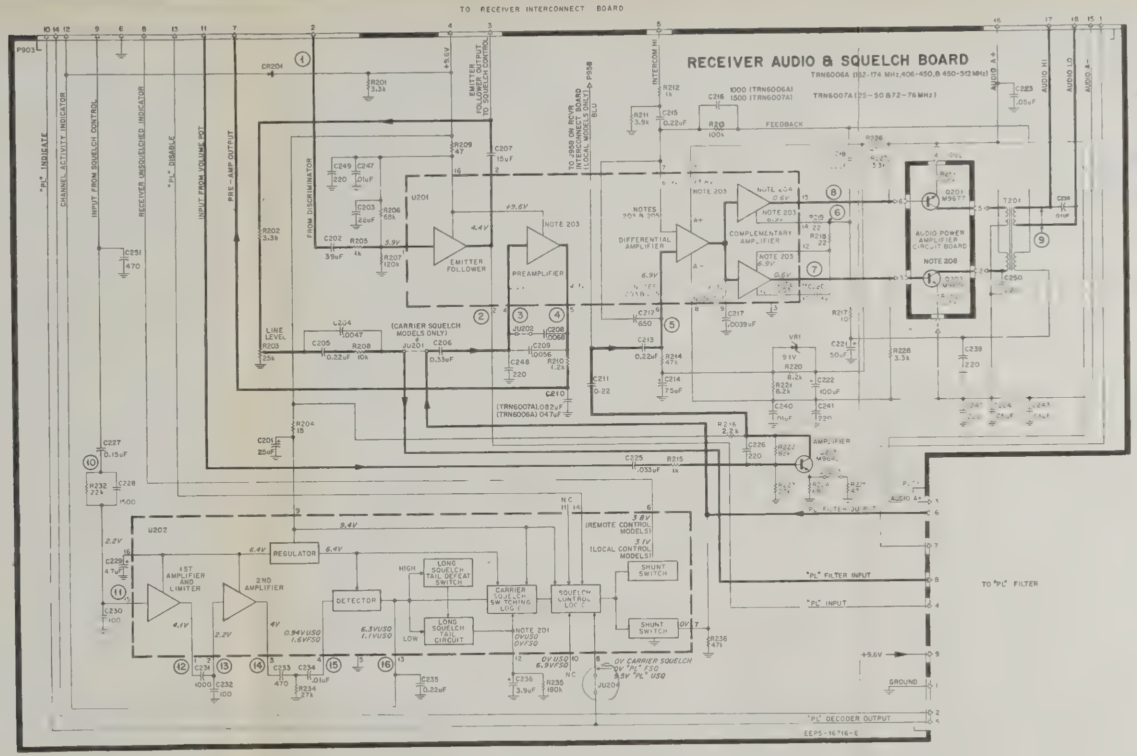


5 V/DIV.

TRN6006A/07A Audio and Squelch
Schematic Diagram, Circuit Board Detail,
and Troubleshooting Chart
Motorola No. PEPS-16952-E
(Sheet 1 of 2)
6/23/78-UP


GROUND
AUDIO A+
"PL" INPUT
OUTPUT FROM "PL" DECODER
OUTPUT FROM "PL" FILTER
"PL" FILTER INPUT
+9.6 V
1
2 INPUT FROM DISCRIMINATOR
3 EMITTER FOLLOWER OUT TO SQUELCH CONTROL
4 +9.6V
5 INTERCOM HI
6 GROUND
7 PREAMP OUTPUT
8 RECEIVER UNSQUELCHED INDICATOR
9 INPUT FROM SQUELCH CONTROL
10 "PL" INDICATE
11 INPUT FROM VOLUME POT
12 CHANNEL ACTIVITY INDICATOR
13 "PL" DISABLE
14
15 AUDIO A-
16 AUDIO A+
17 AUDIO HI
18 AUDIO LO
U201
U202
SOLDER SIDE
COMPONENT SIDE
DL-DEPS-16778-A

SHOWN FROM SOLDER SIDE


TO RECEIVER INTERCONNECT BOARD
RECEIVER AUDIO & SQUELCH BOARD
TRN6006A (132-174 MHz,406-450,& 450-512 MHz)
TRN6007A (25-50 & 72-76 MHz)
P903
"PL" INDICATE
CHANNEL ACTIVITY INDICATOR
INPUT FROM SQUELCH CONTROL
RECEIVER UNSQUELCHED INDICATOR
"PL" DISABLE
INPUT FROM VOLUME POT
PRE-AMP OUTPUT
FROM DISCRIMINATOR
EMITTER FOLLOWER OUTPUT TO SQUELCH CONTROL
INTERCOM HI
AUDIO A+
AUDIO HI
AUDIO LO
AUDIO A-
FEEDBACK
C216 1000 (TRN6006A) 1500 (TRN6007A)
EMITTER FOLLOWER
PREAMPLIFIER
DIFFERENTIAL AMPLIFIER
COMPLEMENTARY AMPLIFIER
AUDIO POWER AMPLIFIER CIRCUIT BOARD
LINE LEVEL
(CARRIER SQUELCH MODELS ONLY)
1ST AMPLIFIER AND LIMITER
2ND AMPLIFIER
REGULATOR
DETECTOR
LONG SQUELCH TAIL DEFEAT SWITCH
LONG SQUELCH TAIL CIRCUIT
CARRIER SQUELCH SW TCHING LOGIC
SQUELCH CONTROL LOGIC
SHUNT SWITCH
(REMOTE CONTROL MODELS)
(LOCAL CONTROL MODELS)
0V CARRIER SQUELCH
TO "PL" FILTER
"PL" FILTER INPUT
"PL" INPUT
+9.6V
GROUND
"PL" DECODER OUTPUT
DEPS-16796-E

NOTE

201. +5.6 VOLTS WHEN THRESHOLD SIGNAL JUST OPENS SQUELCH (I.E., APPROXIMATELY 6 dB QUIETING SIGNA[illegible] WITH SQUELCH CONTROL AT THRESHOLD).
202. WHERE MORE THAN ONE V[illegible]
203. [illegible] WITH RESPECT TO A[illegible]
204. [illegible] WITH RESPECT TO A+
205. [illegible] THE SAME VALUE
206. [illegible]
207. [illegible] MEASUREMENTS [illegible]
208. [illegible]
209. [illegible] MUST BE REMOVED FOR AND [illegible] SEE JUMPER TABLE FOR JUMPER [illegible]

JUMPER [illegible]

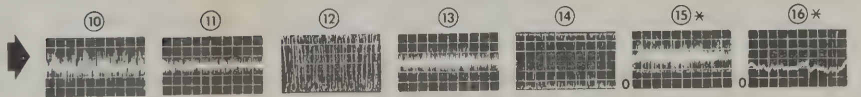
JUMPER	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
JU203	CONNECTED TO PROVIDE [illegible] SPEAKER WITH LINE LE[illegible] LESS(REMOTE CONTRO[illegible]
JU204	CUT FOR "AND SQUE[illegible]

ALL SQUELCH CIRCUIT OSCILLOSCOPE WAVEFORMS TAKEN UNDER FOLLOWING CONDITIONS

1 VERTICAL SENSITIVITY = 0.5 V/DIV.
2. HORIZONTAL DEFLECTION = 2 msec/DIV.
3 SQUELCH CONTROL FULLY CLOCKWISE (ON) NO EXTERNAL SIGNAL APPLIED.
*4. WAVEFORMS ⑮ AND ⑯ ARE DC COUPLED WITH ZERO AT BOTTOM, OTHERS AC COUPLED.

EPS-6534-O

SQUELCH CIRCUIT WAVEFORMS

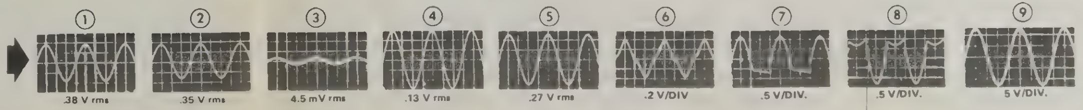


ALL AUDIO CIRCUIT OSCILLOSCOPE WAVEFORMS TAKEN UNDER THE FOLLOWING CONDITIONS

1 VERTICAL SENSITIVITY SHOWN UNDER EACH WAVEFORM.
2 HORIZONTAL DEFLECTION = .25 msec/DIV.
3 SQUELCH CONTROL FULLY COUNTERCLOCKWISE (OFF) 1000 uV RF SIGNAL INPUT MODULATED WITH 1000 Hz TONE WITH +3.0 kHz DEVIATION
4 VOLUME CONTROL SET FOR 9.0 V rms AT LOAD
5 OUTPUT TERMINATED IN 8 OHM LOAD
6 R203 SET FOR 175 mV AT PIN 7 WITH +5 kHz DEVIATION (1 kHz TONE)

EPS 8804-O

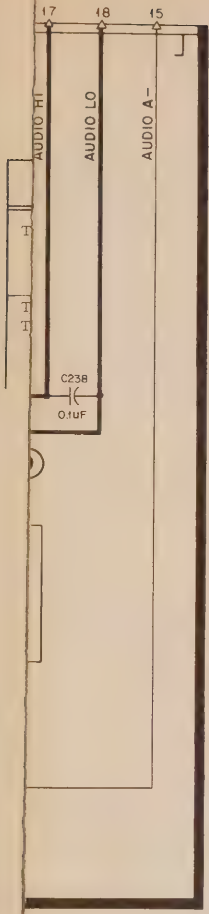
AUDIO CIRCUIT WAVEFORMS



TRN6006A/07A Audio and Squelch
Schematic Diagram, Circuit Board Detail,
and Troubleshooting Chart
Motorola No. PEPS-16952-F
(Sheet 1 of 2)
6/23/78-UP

REVISIONS PEPS-16952-E

CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
N6006A N6007A	C237	DELETED 23-84762H04, 2.2 uF. WAS CONNECTED BETWEEN GROUND AND PIN 10 OF U202.	U202



"MICOR" "SENSITRON" RECEIVER AUDIO & SQUELCH BOARD

MODEL TLN4754A (25-50 MHz & 72-76 MHz)
MODEL TLN4725A (132-174 MHz)

FUNCTION–

Provides audio amplification and audio squelching.

RECEIVER AUDIO & SQUELCH BOARD

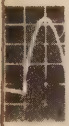
201. +5.6 VOLTS WHEN THRESHOLD SIGNAL JUST OPENS SQUELCH (I.E., APPROXIMATELY 6 dB QUIETING SIGNAL WITH SQUELCH CONTROL AT THRESHOLD).
202. WHERE MORE THAN ONE VOLTAGE READING APPEARS:
USQ = RECEIVER UNSQUELCHED
FSQ = RECEIVER FULLY SQUELCHED
203. VOLTAGE MEASURED WITH RESPECT TO A-.
204. VOLTAGE MEASURED WITH RESPECT TO A+.
205. VOLTAGES AT IC201-6 AND -7 MUST BE THE SAME VALUE.
206. UNLESS OTHERWISE STATED: CAPACITOR VALUES ARE IN PICOFARADS.
207. UNLESS OTHERWISE STATED, VOLTAGE MEASUREMENTS ARE FOR DC VOLTAGES ± 10% MEASURED WITH AN 11 MEGOHM INPUT RESISTANCE VOLTMETER WITH RESPECT TO CHASSIS GROUND.
208. AUDIO POWER AMPLIFIER IS NOT PART OF AUDIO & SQUELCH BOARD.
209. JUMPER JU204 MUST BE REMOVED FOR "AND SQUELCH" OPERATION (SEE "RECEIVER INTERCONNECT UNIT" SECTION).

EPS-8578-A

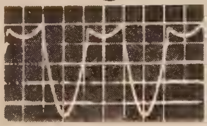
JUMPER TABLE

JUMPER	USE
JU201	CONNECTED IN CARRIER SQUELCH STATIONS.
JU202	CONNECTED IN CARRIER SQUELCH STATIONS.
JU203	CONNECTED TO PROVIDE 10 WATTS AUDIO AT SPEAKER WITH LINE LEVELS OF -10 dBM OR LESS (REMOTE CONTROL STATIONS ONLY).
JU204	CUT FOR "AND SQUELCH"

EPS-9062-A


V.

⑧


.5 V/DIV.

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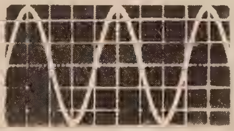
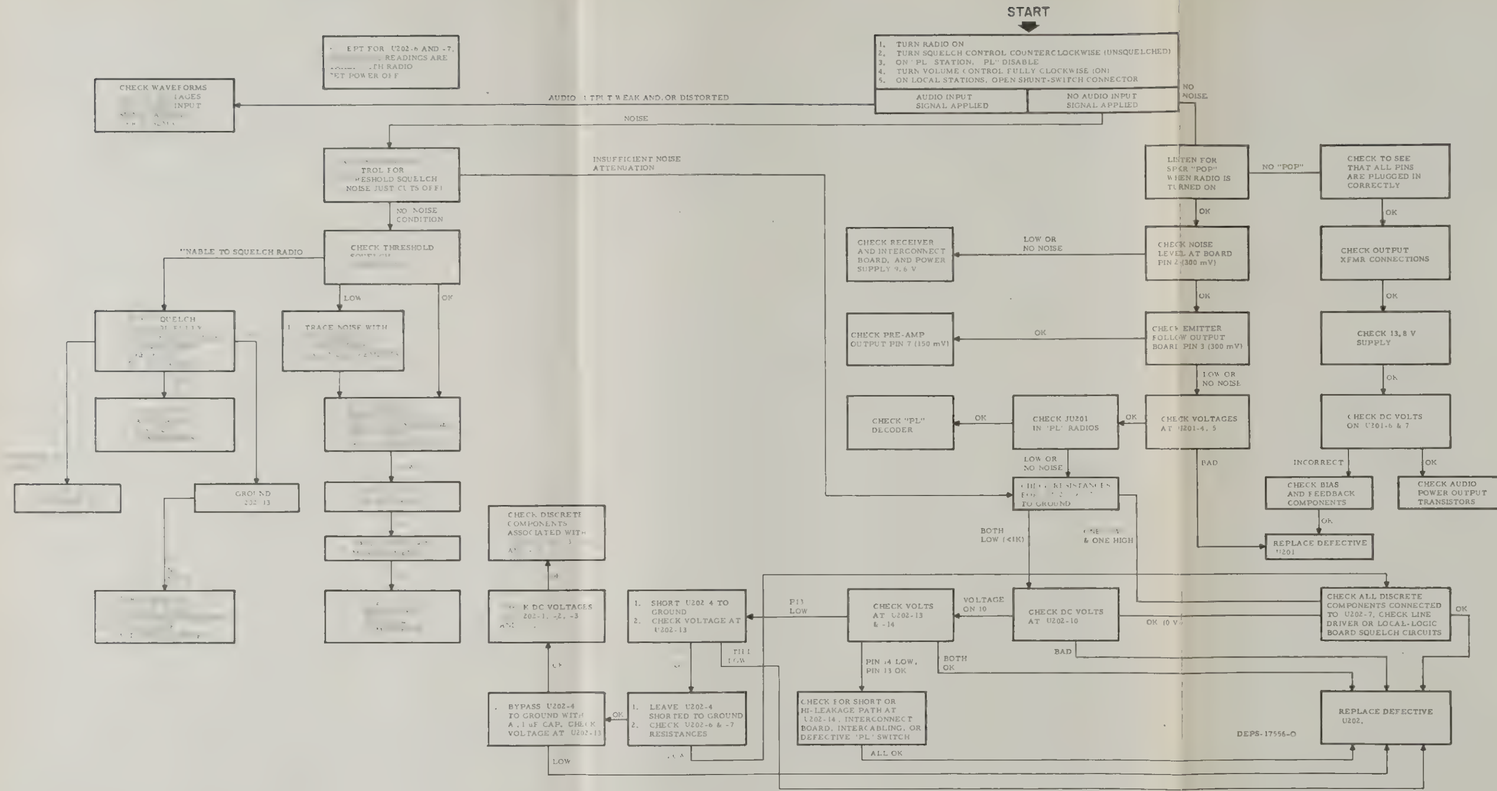

5 V/DIV.


START
1. TURN RADIO ON
2. TURN SQUELCH CONTROL COUNTERCLOCKWISE (UNSQUELCHED)
3. ON "PL" STATION, "PL" DISABLE
4. TURN VOLUME CONTROL FULLY CLOCKWISE (ON)
5. ON LOCAL STATIONS, OPEN SHUNT-SWITCH CONNECTOR
AUDIO INPUT SIGNAL APPLIED
NO AUDIO INPUT SIGNAL APPLIED
NO NOISE
READINGS ARE
SET POWER OFF
CHECK WAVEFORMS
INPUT
AUDIO OUTPUT WEAK AND/OR DISTORTED
NOISE
TROL FOR
ESHOLD SQUELCH
NOISE JUST CUTS OFF)
INSUFFICIENT NOISE ATTENUATION
NO NOISE CONDITION
CHECK THRESHOLD
UNABLE TO SQUELCH RADIO
LOW
OK
QUELCH
1 TRACE NOISE WITH
GROUND
202-13
LISTEN FOR SPKR "POP" WHEN RADIO IS TURNED ON
NO "POP"
CHECK TO SEE THAT ALL PINS ARE PLUGGED IN CORRECTLY
OK
CHECK RECEIVER AND INTERCONNECT BOARD, AND POWER SUPPLY 9.6 V
LOW OR NO NOISE
CHECK NOISE LEVEL AT BOARD PIN 2 (300 mV)
CHECK OUTPUT XFMR CONNECTIONS
CHECK PRE-AMP OUTPUT PIN 7 (150 mV)
CHECK EMITTER FOLLOW OUTPUT BOARD PIN 3 (300 mV)
CHECK 13.8 V SUPPLY
LOW OR NO NOISE
CHECK "PL" DECODER
CHECK JU201 IN "PL" RADIOS
CHECK VOLTAGES AT U201-4, 5
CHECK DC VOLTS ON U201-6 & 7
BAD
INCORRECT
CHECK BIAS AND FEEDBACK COMPONENTS
CHECK AUDIO POWER OUTPUT TRANSISTORS
REPLACE DEFECTIVE U201
CHECK RESISTANCES
TO GROUND
BOTH LOW (<1K)
& ONE HIGH
CHECK DISCRETE COMPONENTS ASSOCIATED WITH
K DC VOLTAGES
202-1, -2, -3
1. SHORT U202-4 TO GROUND
2. CHECK VOLTAGE AT U202-13
P13 LOW
CHECK VOLTS AT U202-13 & -14
VOLTAGE ON 10
CHECK DC VOLTS AT U202-10
OK (10 V)
CHECK ALL DISCRETE COMPONENTS CONNECTED TO U202-7, CHECK LINE DRIVER OR LOCAL-LOGIC BOARD SQUELCH CIRCUITS
PIN 14 LOW, PIN 13 OK
BOTH OK
BAD
BYPASS U202-4 TO GROUND WITH A .1 uF CAP. CHECK VOLTAGE AT U202-13
1. LEAVE U202-4 SHORTED TO GROUND
2. CHECK U202-6 & -7 RESISTANCES
CHECK FOR SHORT OR HI-LEAKAGE PATH AT U202-14, INTERCONNECT BOARD, INTERCABLING, OR DEFECTIVE "PL" SWITCH
ALL OK
LOW
REPLACE DEFECTIVE U202.
DEPS-17556-O

TRN6006A/07A Audio and Squelch
Schematic Diagram, Circuit Board Detail,
and Troubleshooting Chart
Motorola No. PEPS-16952-E
(Sheet 2 of 2)
/78-UP

PARTS LIST

LEGEND

L = 25-50 & 72-76 MHz
H = 132-174 MHz, 406-450 MHz, 450-512 MHz, & 806-866 MHz

TRN6007A Receiver Audio & Squelch Board
(25-50 & 72-76 MHz)
TRN6006A Receiver Audio & Squelch Board
(132-174 MHz, 406-450 MHz, 450-512 MHz,
806-866 MHz)

PL-3269-C

This parts list covers two models of the Receiver Audio & Squelch Board. Where differences exist a letter suffix L or H is added to the reference symbol to show the applicable unit.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed; uF; ±10%; 100 V; unl. stated
C201	23-83210A01	25 +150-10%; 25 V
C202	23-82783B36	39; 10 V
C203	23-84762H10	22 ±20%; 15 V
C204	8-83813H12	.0047
C205	8-83813H11	0.22; 75 V
C206	8-83813H29	0.33; 50 V
C207	23-82783B24	15; 25 V
C208	8-83813H01	.0068
C209	8-83813H26	.0056 ±5%; 50 V
C210L	8-82905G45	.082; 50 V
C210H	8-82905G03	.047; 50 V
C211	8-83813H11	0.22; 75 V
C212	21-848236	650 pF ±5%; 500 V
C213	8-83813H11	0.22; 75 V
C214	23-84081B03	75 +150-10%; 15 V
C215	8-83813H11	0.22; 75 V
C216L	21-82187B20	1000 pF
C216H	21-82187B31	1500 pF
C217	21-82187B43	.0033; 200 V
C218	8-83813H11	0.22; 75 V
C219		NOT USED
C220	21-83406D46	56 pF ±5%; 500 V; N150
C221	23-84081B01	50 +100-10%; 25 V
C222	23-83210A08	100 +150-10%; 25 V
C223, 224	21-82372C04	.05 +80-20%; 25 V
C225	8-82905G16	.033
C226	21-859942	220 pF ±5%; 500 V
C227	8-83813H07	0.15; 75 V
C228	21-84426B63	1500 pF ±5%
C229	23-84762H07	4.7 ±20%; 10 V
C230	21-84426B06	100 pF ±5%; 500 V
C231	21-84493B05	1000 pF; 200 V; N2200
C232	21-82133G03	100 pF ±5%; 500 V; N750
C233	21-84426B11	470 pF ±5%; 500 V
C234	8-83813H31	.01; 100 V
C235	8-83813H11	0.22; 75 V
C236	23-84762H08	3.9 ±20%; 15 V
C237		NOT USED
C238	21-82372C01	0.1 +80-20%; 25 V
C239	21-83596E10	220 pF ±20%; 500 V
C240	21-832501	.01 +60-40%; 250 V
C241, 242	21-83596E10	220 pF ±20%; 500 V
C243	21-832501	.01 +60-40%; 250 V
C244	21-82133G03	100 pF ±5%; 500 V
C245, 246		NOT USED
C247	21-832501	.01 +60-40%; 250 V
C248 thru 250	21-83596E10	220 pF ±20%; 500 V
C251	21-84426B11	470 pF ±5%; 500 V
		DIODE: (SEE NOTE)
CR201	48-83654H01	silicon
		CONNECTOR, plug:
P201		consists of contact pins mounted on circuit board
		TRANSISTOR: (SEE NOTE)
Q201	48-869642	NPN: type M9642
		RESISTOR, fixed: ±5%; 1/4 W; unl. stated
R201, 202	6-124A61	3.3k
R203	18-83083G24	variable: 25k ±30%
R204	6-124C05	15 ±10%
R205	6-124A49	1k
R206	6-124A93	68k
R207	6-124A99	120k
R208	6-124A73	10k
R209	6-124C17	47 ±10%
R210	6-124A51	1.2k
R211	6-124A63	3.9k
R212	6-124A49	1k
R213	6-124C97	100k ±10
R214	6-124A89	47k
R215	6-124A49	1k
R216	6-124A57	2.2k
R217	6-124C01	10 ±10%
R218, 219	6-124A09	22
R220, 221	6-124A71	8.2k
R222	6-124A95	82k
R223	6-124A83	27k
R224	6-124A45	680
R225, 226	6-124C17	47 ±10%
R227, 228	6-124A61	3.3k
R229 thru 231		NOT USED
R232	6-124A81	22k
R233		NOT USED
R234	6-124A83	27k
R235	6-124D04	180k ±10%
R236	6-124C89	47k ±10%
		TRANSFORMER, AF:
T201	25-84083B02	pri: split winding; total res 0.5 Ohms max sec: res 0.8 Ohms max feedback: res 2 Ohms max
		INTEGRATED CIRCUIT: (SEE NOTE)
U201	51-84267A08	type SC6708
U202	51-84267A09	type SC6709
		DIODE: (SEE NOTE)
VR201	48-82256C38	Zener; 9.1 V; 400 mW
NON-REFERENCED ITEMS		
	42-84284B01	RETAINER; 4 req'd.
	3-138162	SCREW, tapping: Phillips rd. hd., 4-40 x 3/8"; 4 req'd. (used for mounting Retainers)
	55-84300B01	HANDLE (long)
	55-84300B02	HANDLE (short)
	29-84028H01	TERMINAL, contact; 18 req'd. (long)
	29-84028H02	TERMINAL, contact; 24 req'd. (short)

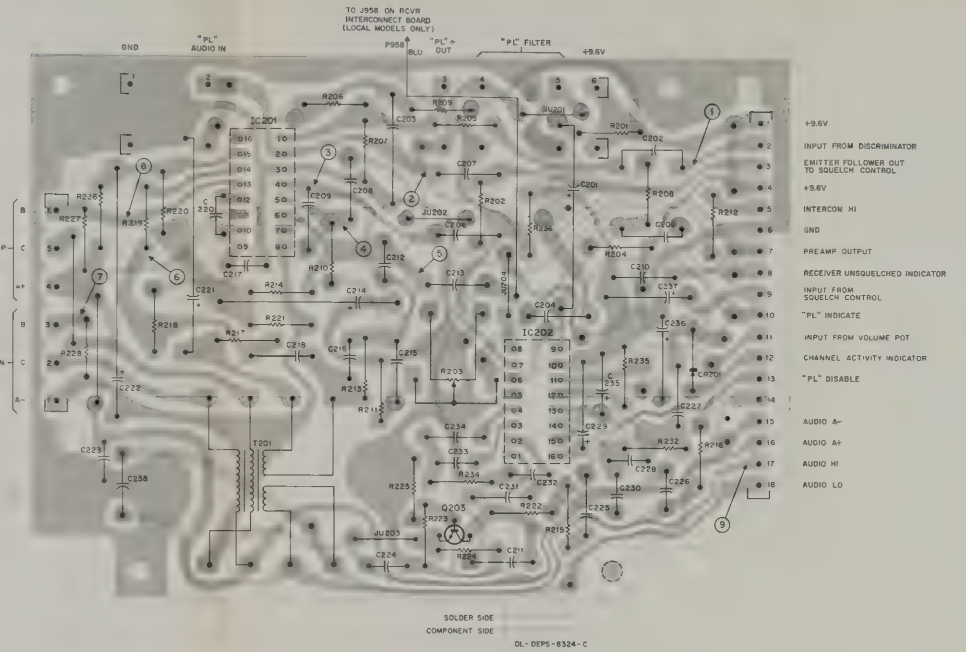
NOTE: Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.

REVISIONS PEPS-16952-E

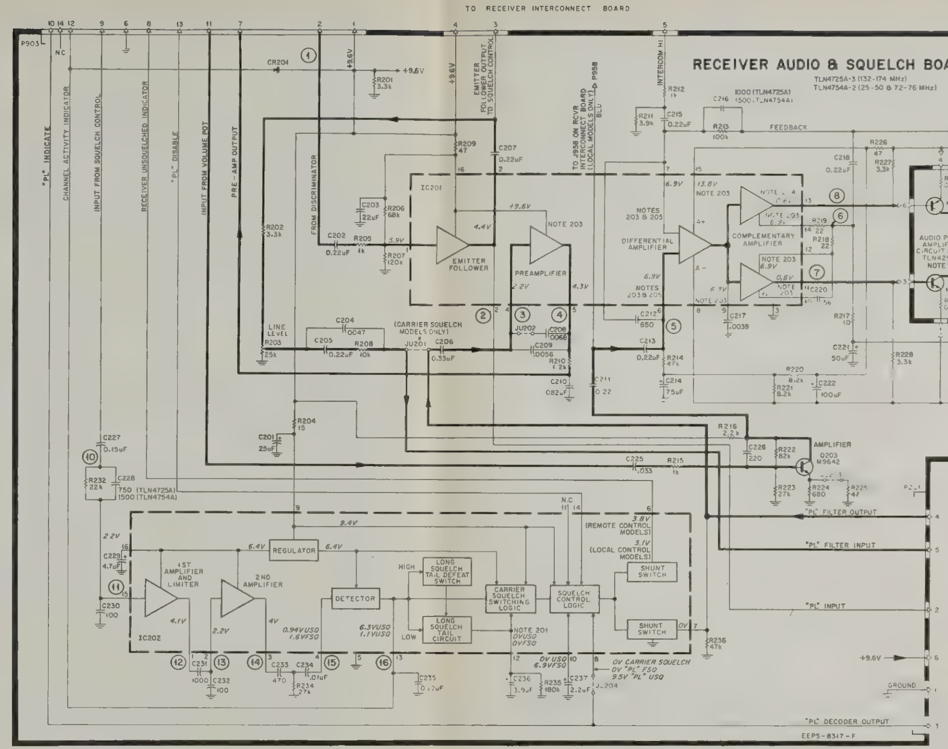
	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
	TRN6006A TRN6007A	C237	DELETED 23-84762H04, 2.2 uF. WAS CONNECTED BETWEEN GROUND AND PIN 10 OF U202.	U202

REVISIONS 68P81030E46-O

CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	R231	DELETED 6-127802, 1k	P903-17, 18 AUDIO HI, LO
	C239	[illegible]	


TO J958 ON RCVR INTERCONNECT BOARD (LOCAL MODELS ONLY)
GND
"PL" AUDIO IN
P958
BLU
"PL" + OUT
"PL" FILTER
+9.6V
IC201
IC202
T201
Q203
JU201
JU202
JU203
JU204
PNP
NPN
B
C
E
A+
A-
1 +9.6V
2 INPUT FROM DISCRIMINATOR
3 EMITTER FOLLOWER OUT TO SQUELCH CONTROL
4 +9.6V
5 INTERCON HI
6 GND
7 PREAMP OUTPUT
8 RECEIVER UNSQUELCHED INDICATOR
9 INPUT FROM SQUELCH CONTROL
10 "PL" INDICATE
11 INPUT FROM VOLUME POT
12 CHANNEL ACTIVITY INDICATOR
13 "PL" DISABLE
14
15 AUDIO A-
16 AUDIO A+
17 AUDIO HI
18 AUDIO LO
SOLDER SIDE
COMPONENT SIDE

DL-DEPS-8324-C


TO RECEIVER INTERCONNECT BOARD
P903
RECEIVER AUDIO & SQUELCH BOARD
TLN4725A-1 (132-174 MHz)
TLN4754A-2 (25-50 & 72-76 MHz)
"PL" INDICATE
CHANNEL ACTIVITY INDICATOR
INPUT FROM SQUELCH CONTROL
RECEIVER UNSQUELCHED INDICATOR
"PL" DISABLE
INPUT FROM VOLUME POT
PRE-AMP OUTPUT
FROM DISCRIMINATOR
EMITTER FOLLOWER OUTPUT TO SQUELCH CONTROL
TO J958 ON RCVR INTERCONNECT BOARD
INTERCOM HI
AUDIO A+
AUDIO LO
AUDIO A-
+9.6V
FEEDBACK
EMITTER FOLLOWER
PREAMPLIFIER
DIFFERENTIAL AMPLIFIER
COMPLEMENTARY AMPLIFIER
AUDIO POWER AMPLIFIER CIRCUIT BOARD TLN4290B NOTE 208
CARRIER SQUELCH MODELS ONLY
LINE LEVEL
AMPLIFIER
Q203
REGULATOR
AMPLIFIER AND LIMITER
AMPLIFIER
DETECTOR
HIGH
LOW
LONG SQUELCH TAIL DEFEAT SWITCH
LONG SQUELCH TAIL CIRCUIT
CARRIER SQUELCH SWITCHING LOGIC
SQUELCH CONTROL LOGIC
SHUNT SWITCH
(REMOTE CONTROL MODELS)
(LOCAL CONTROL MODELS)
IC202
"PL" FILTER OUTPUT
"PL" FILTER INPUT
TO "PL" FILTER
"PL" INPUT
+9.6V
GROUND
"PL" DECODER OUTPUT
DEPS-8317-F

"MICOR" "SENSITRON" RECEIVER AUDIO & SQUELCH BOARD

MODEL TLN4754A (25-50 MHz & 72-76 MHz)
MODEL TLN4725A (132 174 MHz)

FUNCTION–

Provides audio amplification and audio squelching.

RECEIVER AUDIO & SQUELCH BOARD

201. +5.6 VOLTS WHEN THRESHOLD SIGNAL JUST OPENS SQUELCH (I.E., APPROXIMATELY 6 dB QUIETING SIGNAL WITH SQUELCH CONTROL AT THRESHOLD)
202 WHERE MORE THAN ONE VOLTAGE READING APPEARS
USQ = RECEIVER UNSQUELCHED
FSQ = RECEIVER FULLY SQUELCHED
203. VOLTAGE MEASURED WITH RESPECT TO A .
204. VOLTAGE MEASURED WITH RESPECT TO A+.
205. VOLTAGES AT IC201-6 AND -7 MUST BE THE SAME VALUE
206 UNLESS OTHERWISE STATED CAPACITOR VALUES ARE IN PICOFARADS
207. UNLESS OTHERWISE STATED, VOLTAGE MEASUREMENTS ARE FOR DC VOLTAGES ± 10% MEASURED WITH AN 11 MEGOHM INPUT RESISTANCE VOLTMETER WITH RESPECT TO CHASSIS GROUND.
208. AUDIO POWER AMPLIFIER IS NOT PART OF AUDIO & SQUELCH BOARD
209. JUMPER JU204 MUST BE REMOVED FOR "AND SQUELCH" OPERATION (SEE "RECEIVER INTERCONNECT UNIT" SECTION)

EPS-8578-A

JUMPER TABLE

JUMPER	USE
JU201	CONNECTED IN CARRIER SQUELCH STA[illegible]
JU202	CONNECTED IN CARRIER SQUELCH STA[illegible]
JU203	CONNECTED TO PROVIDE 10 WATTS A[illegible] SPEAKER WITH LINE LEVELS OF -10 d[illegible] LESS (REMOTE CONTROL STATIONS[illegible]
JU204	CUT FOR "AND SQU[illegible]

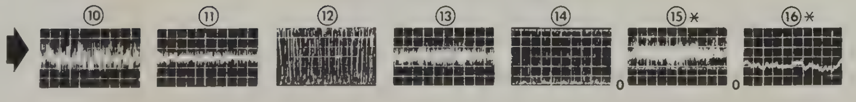
EPS-9062-A

ALL SQUELCH CIRCUIT OSCILLOSCOPE WAVEFORMS TAKEN UNDER FOLLOWING CONDITIONS:

1. VERTICAL SENSITIVITY = 0.5 V/DIV.
2. HORIZONTAL DEFLECTION = 2 msec/DIV.
3. SQUELCH CONTROL FULLY CLOCKWISE (ON). NO EXTERNAL SIGNAL APPLIED
*4. WAVEFORMS ⑮ AND ⑯ ARE DC COUPLED WITH ZERO AT BOTTOM, OTHERS AC COUPLED.

EPS-6534-O

SQUELCH CIRCUIT WAVEFORMS

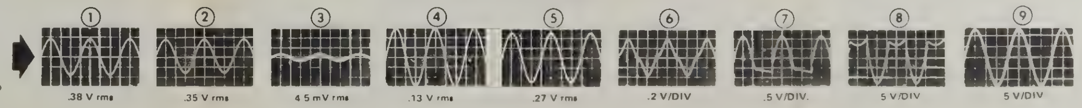


ALL AUDIO CIRCUIT OSCILLOSCOPE WAVEFORMS TAKEN UNDER THE FOLLOWING CONDITIONS

1. VERTICAL SENSITIVITY SHOWN UNDER EACH WAVEFORM
2 HORIZONTAL DEFLECTION = 25 msec/DIV
3 SQUELCH CONTROL FULLY COUNTERCLOCKWISE (OFF) 1000 uV RF SIGNAL INPUT MODULATED WITH 1000 Hz TONE WITH +3 0 kHz DEVIATION
4 VOLUME CONTROL SET FOR 9 0 V rms AT LOAD
5. OUTPUT TERMINATED IN 8-OHM LOAD
6. R203 SET FOR 175 mV AT PIN 7 WITH +5 kHz DEVIATION (1 kHz TONE)

EPS 8804 O

AUDIO CIRCUIT WAVEFORMS



"MICOR" "SENSITRON" RECEIVER AUDIO POWER AMPLIFIER

MODEL TLN4290B

1. DESCRIPTION

The audio power amplifier provides the required power to drive an 8-ohm speaker with ten watts of audio power or a 16-ohm speaker with 5 watts of audio power at less than five percent overall distortion. Two complementary power transistors (N-P-N and P-N-P types) operating in class AB mode with two current limiting resistors develop this power. The audio drive from the audio and squelch board is routed to this board, amplified, and then returned to the audio and squelch board where it is applied to the audio output transformer.

The aluminum transistor mounting plate is anodized with a thin, very tough material. This mounting plate provides excellent electrical insulation and thermal conduction properties between the transistors and the heat sink.

2. SERVICING

a. Performance Checks

Performance checks on this board consist of taking resistance readings as is done for any transistor or resistor. It should be noted, however, that many VTVM's and solid-state multimeters do not have sufficient voltage at the test probes to forward bias a transistor junction into conduction and, therefore, should not be used. An inexpensive volt-ohm meter of 1,000 to 20,000 ohms-per-volt sensitivity is sufficient for performing these checks.

NOTE

DO NOT INSERT METER TEST PROBE TIPS INTO FEMALE CONNECTORS ON THE BOARD. TO DO SO COULD CAUSE DAMAGE TO THE CONNECTORS AND RESULT IN POOR ELECTRICAL INTERCONNECTION WITH THE AUDIO AND SQUELCH BOARD.

b. Transistor Replacement

Care must be exercised to prevent damage (such as a scratch) to the mounting plate anodizing at the transistor-mounting plate interface. Should the anodizing in this area become scratched, original performance can only be restored by the use of a new anodized plate. The plate can not be "repaired" by the use of any type of insulating washer without a loss in thermal conduction capability.

Factory replacement transistors are supplied with pre-formed leads to properly fit onto the

MOTOROLA INC.
Communications Division

service publications
1301 E. Algonquin Road, Schaumburg, IL 60196

ELECTRICAL PARTS LIST

LEGEND
L = 25-50 MHz & 72-76 MHz
H = 132-174 MHz

Audio & Squelch Board
TLN4754A (25-50 MHz & 72-76 MHz)
TLN4725A (132-174 MHz)
PL-1707-F

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed; uF; ±10%; 100 V, unl stated
C201	23-83210A01	25 +150-10%; 25 V
C202	8-83813H11	0.22; 75 V
C203	23-84762H10	22, 15 V
C204	8-83813H12	.0047
C205	8-83813H11	0.22; 75 V
C206	8-83813H29	0.33; 50 V
C207	8-83813H11	0.22; 75 V
C208	8-83813H01	.0068
C209	8-83813H26	.0056 ±5%; 50 V
C210	8-82905G45	.082
C211	8-83813H11	0.22; 75 V
C212	21-848236	650 pF ±5%; 500 V
C213	8-83813H11	0.22; 75 V
C214	23-84081B03	75 +150-10%; 15 V
C215	8-83813H11	0.22; 75 V
C216L	21-82187B31	1500 pF
C216H	21-82187B20	1000 pF
C217	21-82187B43	.0039; 200 V
C218	8-83813H11	0.22; 75 V
C220	21-83406D46	56 pF ±5%; 500 V; N150
C221	23-84081B01	50 +100-10%; 25 V
C222	23-83210A08	100 ±20%; 25 V
C223, 224	21-82372C04	.05 +80-20%; 25 V
C225	8-82905G16	.033
C226	21-859942	220 pF ±5%; 500 V
C227	8-83813H07	0.15; 75 V
C228L	21-84426B61	1500 pF ±5%
C228H	21-848159	750; 300 V
C229	23-84762H07	4.7 ±20%; 25 V
C230	21-84426B06	100 pF ±5%; 500 V
C231	21-84493B05	1000 pF; 200 V; N2200
C232	21-84426B06	100 pF ±5%; 500 V
C233	21-84426B11	470 pF ±5%; 500 V
C234	8-83813H31	.01; 50 V
C235	8-83813H11	0.22; 75 V
C236	23-84762H08	3.9 ±20%; 15 V
C237	23-84762H04	2.2 ±20%; 25 V
C238	21-82372C01	0.1 +80-20%, 25 V
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR201	48-83654H01	silicon
		INTEGRATED CIRCUIT
IC201	51-84267A08	type M6709
IC202	51-84267A09	type M6709
		CONNECTOR, plug:
P201		consists of contact pins mounted on circuit board (SEE MECHANICAL PARTS LIST)
		TRANSISTOR: (SEE NOTE)
Q203	48-869642	N-P-N; type M9642
		RESISTOR, fixed: ±5%; 1/4W; unl stated
R201, 202	6-129981	3.3k
R203	18-83083G24	variable: 25k ±30%
R204	6-131377	15
R205	6-129805	1k
R206	6-129299	68k
R207	6-131446	120k
R208	6-129668	10k
R209	6-129233	47 ±10%
R210	6-129708	1.2k
R211	6-129819	3.9k
R212	6-129805	1k
R213	6-129226	100k ±10%
R214	6-131527	47k
R215	6-129805	1k
R216	6-129804	2.2k
R217	6-129755	10 ±10%
R218, 219	6-124A09	22
R220, 221	6-129983	8.2k
R222	6-124A95	82k
R223	6-129886	27k
R224	6-129984	680
R225, 226	6-129233	47 ±10%
R227	6-129981	3.3k
R228	6-129981	3.3k
R232	6-129662	22k
R234	6-129886	27k
R235	6-129229	180k ±10%
R236	6-128952	47k ±10%

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
T201	25-84083B02	TRANSFORMER, AF: pri: split winding; total res 0.5 Ohms max sec: res 0.8 Ohms max feedback: res 2 Ohms max

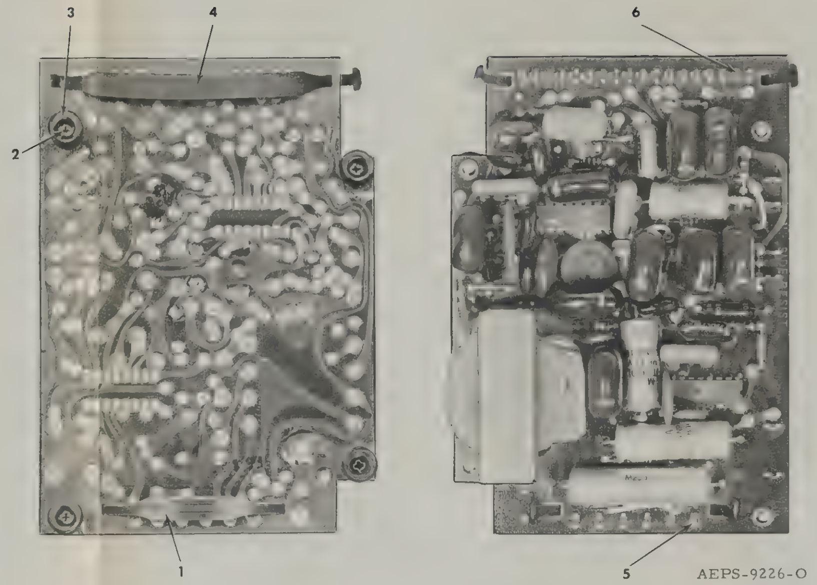
NOTE:

Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.

AUDIO & SQUELCH BOARD

Audio & Squelch Board, Models: TLN4289A and B;
TLN4310A and B, TLN4725A and TLN4754A
PL-852-F

CODE NO.	MOTOROLA PART NO.	DESCRIPTION
1	55B84300B02	HANDLE (short)
2	3S136905	LOCKSCREW, tapping #4 x 5/16" (4 req'd)
3	42C84284B01	RETAINER, screw (4 req'd)
4	55B84300B01	HANDLE (long)
5	29C84028H02	PIN (short)
6	29C84028H01	PIN (long)

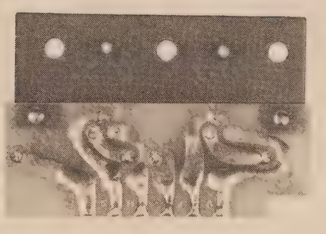


AEPS-9226-O

Models TLN4725A and TLN4754A
Receiver Audio & Squelch
Parts List
Motorola No. PEPS-9225-E
10/20/76-UP

"MICOR" "SENSITRON" RECEIVER AUDIO POWER AMPLIFIER

MODEL TLN4290B



1. DESCRIPTION

The audio power amplifier provides the required power to drive an 8-ohm speaker with ten watts of audio power or a 16-ohm speaker with 5 watts of audio power at less than five percent overall distortion. Two complementary power transistors (N-P-N and P-N-P types) operating in class AB mode with two current limiting resistors develop this power. The audio drive from the audio and squelch board is routed to this board, amplified, and then returned to the audio and squelch board where it is applied to the audio output transformer.

The aluminum transistor mounting plate is anodized with a thin, very tough material. This mounting plate provides excellent electrical insulation and thermal conduction properties between the transistors and the heat sink.

2. SERVICING

a. Performance Checks

Performance checks on this board consist of taking resistance readings as is done for any transistor or resistor. It should be noted, however, that many VTVM's and solid-state multimeters do not have sufficient voltage at the test probes to forward bias a transistor junction into conduction and, therefore, should not be used. An inexpensive volt-ohm meter of 1,000 to 20,000 ohms-per-volt sensitivity is sufficient for performing these checks.

NOTE

DO NOT INSERT METER TEST PROBE TIPS INTO FEMALE CONNECTORS ON THE BOARD. TO DO SO COULD CAUSE DAMAGE TO THE CONNECTORS AND RESULT IN POOR ELECTRICAL INTERCONNECTION WITH THE AUDIO AND SQUELCH BOARD.

b. Transistor Replacement

Care must be exercised to prevent damage (such as a scratch) to the mounting plate anodizing at the transistor-mounting plate interface. Should the anodizing in this area become scratched, original performance can only be restored by the use of a new anodized plate. The plate can not be "repaired" by the use of any type of insulating washer without a loss in thermal conduction capability.

Factory replacement transistors are supplied with pre-formed leads to properly fit onto the

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"DIGITAL PRIVATE-LINE" DECODER

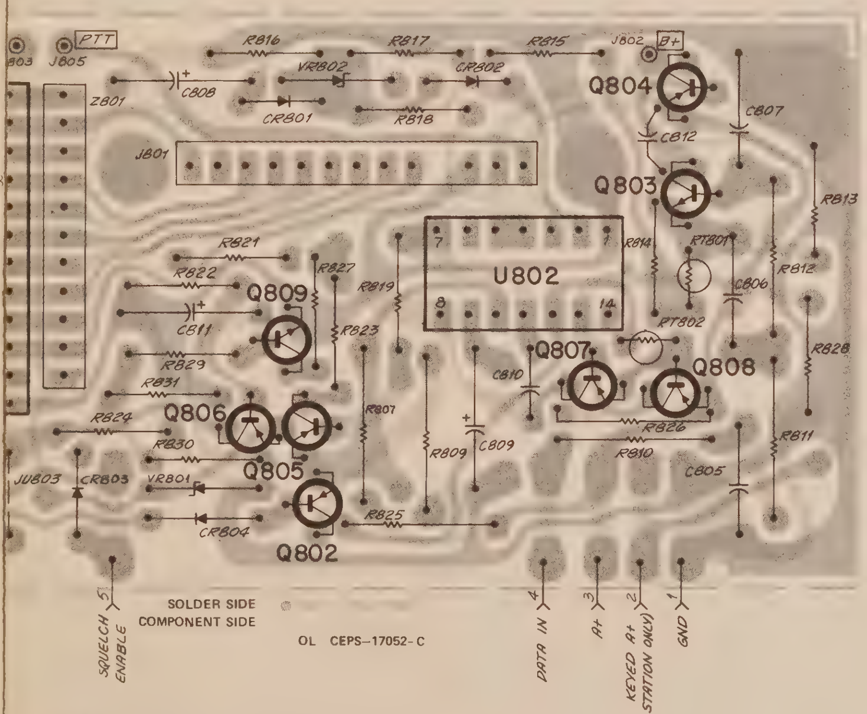
MODEL TLN5729A

FUNCTION

1. Decodes A 23-bit binary code word to unsquelch the receiver.
2. In radios with simplex "Digital Private-Line" operation, generates a 23-bit binary code word when the transmitter is keyed.

TECHNICAL CHARACTERISTICS

CODE DETERMINING DEVICE	TRN6005A CODE PLUG
CODE FORMAT	23-BIT WORD
CODE FREQUENCY SPECTRUM	11-67 Hz
OUTPUT	SWITCHED 5.3 V DC


PTT
J803
J805
R816
R817
R815
J802
B+
C808
VR802
CR802
Q804
Z801
CR801
R818
C807
C812
J801
Q803
R813
R821
U802
7
1
8
14
R814
RT801
R822
R827
R819
C806
R812
Q809
C811
R823
RT802
R828
R829
Q807
Q808
R831
C810
R824
Q806
R807
R826
C809
R830
R809
R810
R811
Q805
C805
JU803
CR803
VR801
R825
CR804
Q802
5
SQUELCH ENABLE
SOLDER SIDE
COMPONENT SIDE
OL CEPS-17052-C
4
DATA IN
3
A+
2
KEYED A+ (MICOR BASE STATION ONLY)
1
GND

SHOWN FROM COMPONENT SIDE

REFER
SYM

PAR
TLN572

C801
C802
C803
C804
C805
C806
C807
C808,
C809
C810

CR801
CR803
CR804

Q801
Q802
Q803,
810
Q804,
806, 8
Q808

R801,
831
R802,
R803
R805
R807,
R808
R810,
812
R813
R814
R815
R816
R817,
822, 8
R818
R819
R821
R823
R825
R826
R827,
R828

RT801
RT802

U801
U802

VR801
VR802

Y801

Z801

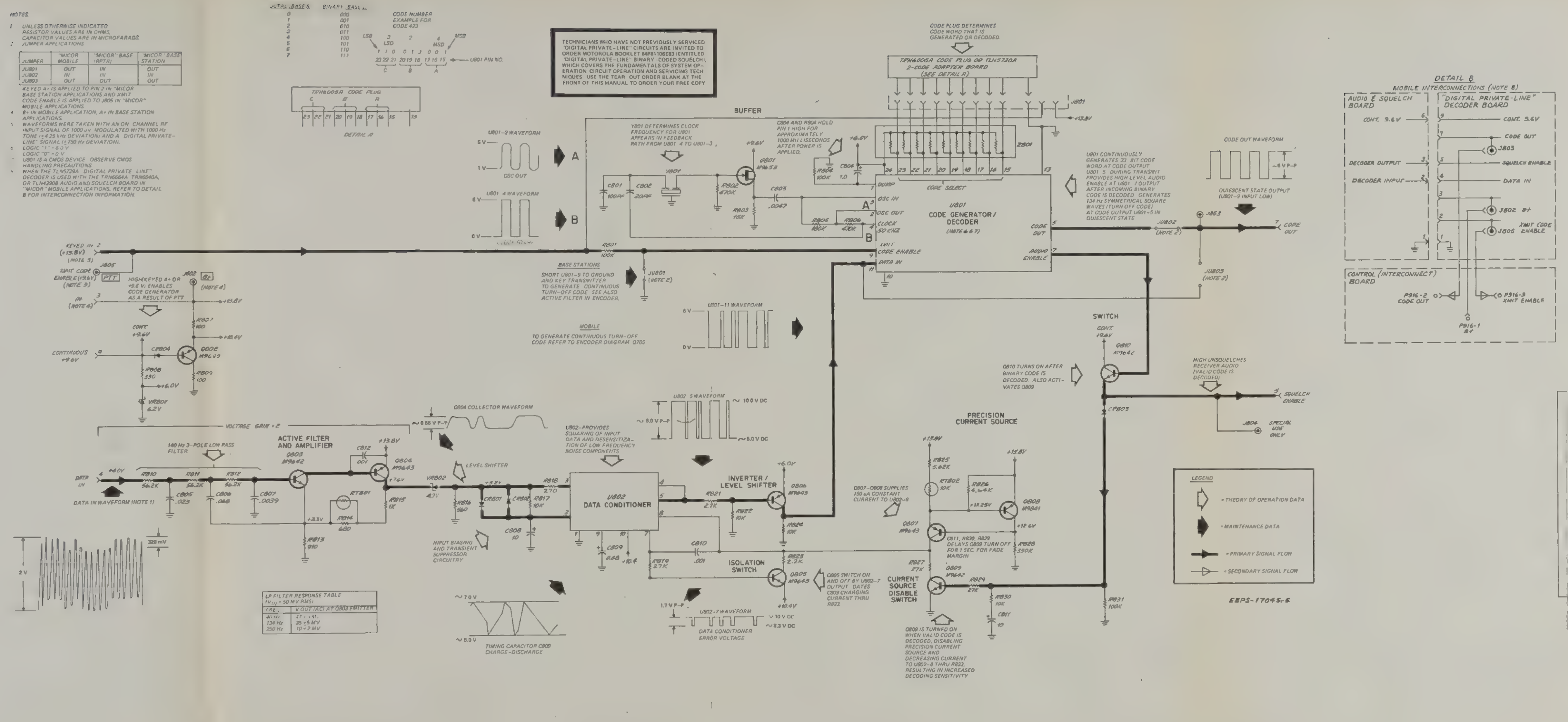
NOTE:

PARTS LIST

T.N5729A Decoder Circuit Board PL-3299-A

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
[illegible]	[illegible]	[illegible]
		DIODE: (SEE NOTE)
[illegible]	[illegible]	hot carrier
[illegible]	48-83654H01	silicon
[illegible]	48-82139G01	germanium
[illegible]	48-869655	field-effect; type M9655
[illegible]	48-869647	PNP; type M9647
Q803, 809, 810	48-869642	NPN; type M9642
Q804, 805, 806, 807	48-869643	PNP; type M9643
[illegible]	48-869841	PNP; type M9841
		[illegible] 1/4 W; unless otherwise stated
R801, 804, 831	6-124C97	100k
R802, 806	6-124D14	470k
R803	6-124C77	15k
[illegible]	[illegible]	[illegible]
[illegible] 809	6-125C25	100 1/2 W
R808	6-124C37	330
R810, 811, 812	6-13755C64	56.2k ±1%
R813	6-124A48	910 ±5%
R814	6-124A45	680 ±5%
R815	6-124A49	1k ±5%
R816	6-124C43	560
R817, 822, 824, 830	6-124C73	10k
R818	6-124C35	270
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
R825	6-13755C67	5620 ±1%
R826	6-10621C59	4640 ±1%
R827, 829	6-124C83	27k
R828	6-124B10	330k ±5%
		[illegible]
RT801	6-865641	300 ohm @ 25°C
RT802	6-82696B01	10k ohms @ 25°C
		[illegible]
[illegible]	[illegible]	[illegible]
U802	51-84320A55	M2055
		VOLTAGE REGULATOR:
VR801	48-83696E07	Zener type: 6.2 V
VR802	48-82256C03	Zener type: 4.70 V
		[illegible]
Y801	48-82003K01	resonator; 50.00000 KC
		[illegible] NETWORK:
Z801	1-80772B36 or 51-82142F02	pull-up, 10-pin

NOTE: For optimum performance, diodes, transistors and integrated circuits must be ordered by Motorola part numbers.


NOTES

1. UNLESS OTHERWISE INDICATED RESISTOR VALUES ARE IN OHMS. CAPACITOR VALUES ARE IN MICROFARADS.
2. JUMPER APPLICATIONS

JUMPER	"MICOR" MOBILE	"MICOR" BASE (RPTR)	"MICOR" BASE STATION
JU801	OUT	IN	OUT
JU802	IN	IN	IN
JU803	OUT	OUT	OUT

3. KEYED A+ IS APPLIED TO PIN 2 IN "MICOR" BASE STATION APPLICATIONS AND XMIT CODE ENABLE IS APPLIED TO J805 IN "MICOR" MOBILE APPLICATIONS.
4. B+ IN MOBILE APPLICATION, A+ IN BASE STATION APPLICATIONS.
5. WAVEFORMS WERE TAKEN WITH AN ON CHANNEL RF INPUT SIGNAL OF 1000 µV MODULATED WITH 1000 Hz TONE (±4.25 kHz DEVIATION) AND A "DIGITAL PRIVATE-LINE" SIGNAL (±750 Hz DEVIATION).
6. LOGIC "1" = 6.0 V LOGIC "0" = 0 V
7. U801 IS A CMOS DEVICE. OBSERVE CMOS HANDLING PRECAUTIONS.
8. WHEN THE TLN5729A "DIGITAL PRIVATE-LINE" DECODER IS USED WITH THE TRN6664A, TRN6640A, OR TLN4290B AUDIO AND SQUELCH BOARD IN "MICOR" MOBILE APPLICATIONS, REFER TO DETAIL B FOR INTERCONNECTION INFORMATION.

TECHNICIANS WHO HAVE NOT PREVIOUSLY SERVICED "DIGITAL PRIVATE-LINE" CIRCUITS ARE INVITED TO ORDER MOTOROLA BOOKLET 68P81106E83 (ENTITLED "DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH), WHICH COVERS THE FUNDAMENTALS OF SYSTEM OPERATION, CIRCUIT OPERATION AND SERVICING TECHNIQUES. USE THE TEAR-OUT ORDER BLANK AT THE FRONT OF THIS MANUAL TO ORDER YOUR FREE COPY.

LEGEND
- ⇨ = THEORY OF OPERATION DATA
- ➡ = MAINTENANCE DATA
- ▶ = PRIMARY SIGNAL FLOW
- ▷ = SECONDARY SIGNAL FLOW

EEPS-17045-E

BUFFER
U801 CODE GENERATOR / DECODER
TRN6005A CODE PLUG OR TLN5730A 2-CODE ADAPTER BOARD (SEE DETAIL A)
TRN6005A CODE PLUG
DETAIL A
CODE PLUG DETERMINES CODE WORD THAT IS GENERATED OR DECODED
Y801 DETERMINES CLOCK FREQUENCY FOR U801 APPEARS IN FEEDBACK PATH FROM U801-4 TO U801-3
U801-2 WAVEFORM
OSC OUT
U801-4 WAVEFORM
U801-11 WAVEFORM
CODE OUT WAVEFORM
QUIESCENT STATE OUTPUT (U801-9 INPUT LOW)
CODE OUT
AUDIO ENABLE
CODE ENABLE
DATA IN
CLOCK
SWITCH
SQUELCH DISABLE
SPECIAL USE ONLY
BASE STATIONS
CONTINUOUS +9.6V
XMIT CODE ENABLE
DATA IN
ACTIVE FILTER AND AMPLIFIER
140 Hz 3-POLE LOW PASS FILTER
LEVEL SHIFTER
U802 DATA CONDITIONER
INVERTER / LEVEL SHIFTER
ISOLATION SWITCH
PRECISION CURRENT SOURCE
CURRENT SOURCE DISABLE SWITCH
INPUT BIASING AND TRANSIENT SUPPRESSOR CIRCUITRY
TIMING CAPACITOR C808 CHARGE-DISCHARGE
U802-7 WAVEFORM
DATA CONDITIONER ERROR VOLTAGES
U802-5 WAVEFORM
Q804 COLLECTOR WAVEFORM
LP FILTER RESPONSE TABLE
DATA IN WAVEFORM (NOTE 5)
DETAIL B
MOBILE INTERCONNECTIONS (NOTE 8)
AUDIO & SQUELCH BOARD
"DIGITAL PRIVATE-LINE" DECODER BOARD
CONT. 9.6V
CODE OUT
J803
DECODER OUTPUT
SQUELCH ENABLE
DECODER INPUT
DATA IN
J802 B+
J805 XMIT CODE ENABLE
CONTROL (INTERCONNECT) BOARD
P916-2 CODE OUT
P916-3 XMIT ENABLE
P916-1 B+

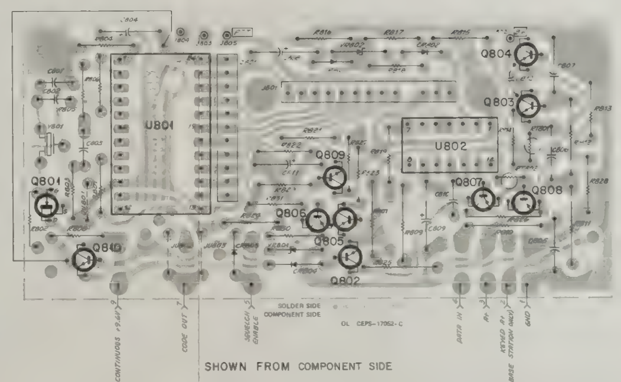
"DIGITAL PRIVATE-LINE" DECODER

MODEL TLN5729A

FUNCTION
1. Decodes A 23-bit binary code word to unsquelch the receiver.
2. In radios with simplex "Digital Private-Line" operation, generates a 23-bit binary code word when [illegible] is keyed.

TECHNICAL CHARACTERISTICS

CODE DETERMINING DEVICE	TRN6005A CODE PLUG
CODE FORMAT	[illegible]
CODE FREQUENCY SPECTRUM	11-67 [illegible]
OUTPUT	SWITCHED 5.3 V DC



U801
U802
Q801
Q802
Q803
Q804
Q805
Q806
Q807
Q808
Q809
Q810
SOLDER SIDE
COMPONENT SIDE
CONTINUOUS +9.6V
CODE OUT
SQUELCH ENABLE
DATA IN

SHOWN FROM COMPONENT SIDE

"DIGITAL PRIVATE-LINE" DECODER

FREQUENCY DETERMINING DEVICE
"PL" TONE FREQUENCY
TONE ACCURACY
TONE BANDWIDTH
TONE SENSITIVITY
OUTPUT
POWER REQUIREMENT

1. DESCRIPTION

This decoder provides a dc outpu
to unsquelch the receiver's audio sec
when the proper PL tone is received.
coder will respond only to a specific,
uous low-frequency tone from a trans
the same "Private-Line" network.

2. FUNCTIONAL OPERATION

2.1 GENERAL

2.1.1 "PL" Tone Present

2.1.1.1 The PL filter passes lo
quency PL tones and attenuates signa
300 Hz. The noise switch shorts ou
quency noise signals. The tone from
filter is limited to a fixed level by th
clipper and then applied to the "Vibra
resonant reed which vibrates when th
same frequency as the reed's resona
When the reed is vibrating, the tone
a detector which develops a dc output
vates the output switch. When the ou
is activated, 9.5 volts is present at i
enable the audio circuits. The output
vates the noise switch.

2.1.1.2 A separate high pass au
located on the PL decod
which allows voice signals above 30
but blocks PL tones. This filter is
series with the audio signal path to p
PL tone from being heard in the spea

2.1.2 "PL" Tone Absent

When no PL tone is prese
output switch is off. The output volt
at this time which inhibits the squelc
prevent an audio output to the speak
switch is off at this time which allow
quency noise to bypass the PL filter
of high frequency noise desensitizes
fiers and acts as an "anti-falsing" f
vent a random low-frequency noise s
activating the resonant reed.

2.2 DECODER INPUT CIRCUITS

2.2.1 The receiver discriminat
nal consists of noise only
carrier signal is being received. W
signal input to the receiver, the nois
and voice audio or voice audio and P

2.2.2 These input signals are r
the low pass filter and noi
A receiver input signal that is modu
with PL tone produces a nominal 60
signal at the input to the decoder.
filter consisting of L801, C802, C8
attenuates sharply all signals above
voice and noise signals above 300 H

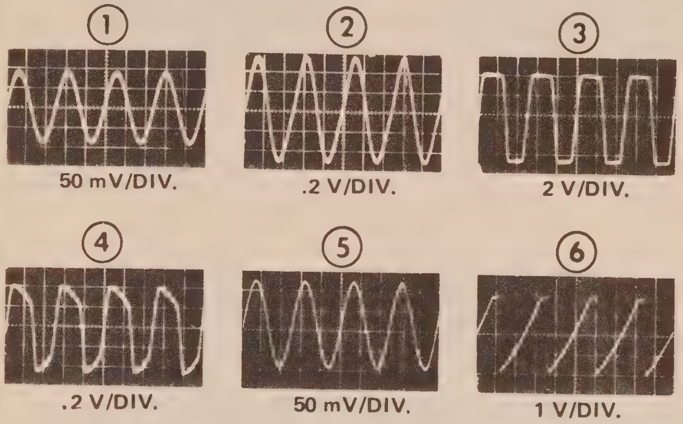
NE "PRIVATE-LINE" DECODER

MODEL TRN6002A

FUNCTION --

Unsquelches receiver upon receipt of proper "Private-Line" tone.

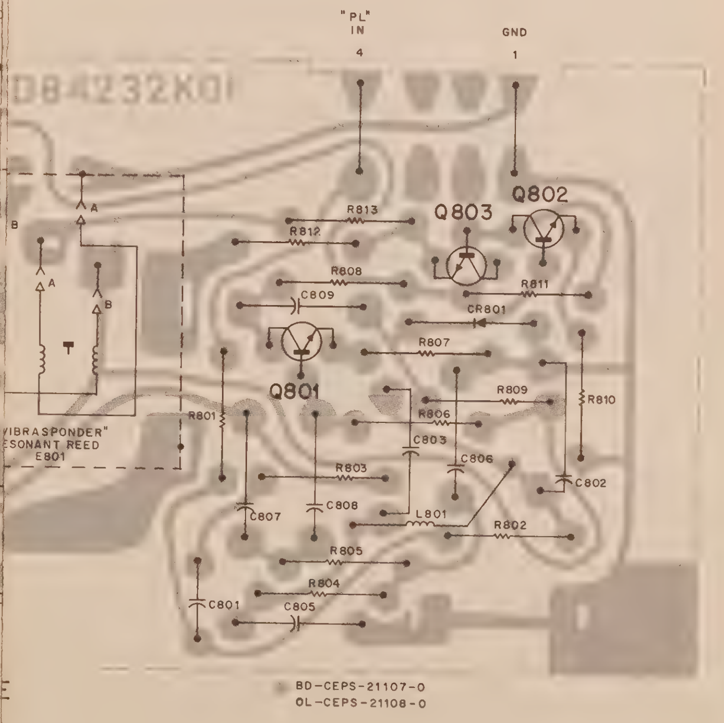
TONE "PL" DECODER WAVEFORMS



① 50 mV/DIV. ② .2 V/DIV. ③ 2 V/DIV.
④ .2 V/DIV. ⑤ 50 mV/DIV. ⑥ 1 V/DIV.

EPS-6182-C

VERSION



BD-CEPS-21107-0
OL-CEPS-21108-0

HANDLING PRECAUTIONS FOR CMOS INTEGRATED CIRCUITS

Many of the integrated circuit devices used in communications equipment are of the CMOS (Complementary Metal Oxide Semiconductor) type. Because of their high open circuit impedance, CMOS ICs are vulnerable to damage from static charges. Care must be taken in handling, shipping, and servicing them and the assemblies in which they are used.

Even though protection devices are provided in CMOS IC inputs, the protection is effective only against overvoltage in the hundreds of volts range such as are encountered in an operating system. In a system, circuit elements distribute static charges and load the CMOS circuits, decreasing the chance of damage. However, CMOS circuits can be damaged by improper handling of the modules even in a system.

To avoid damage to circuits, observe the following handling, shipping, and servicing precautions:

(1) Prior to and while servicing a circuit module, particularly after moving within the service area, momentarily touch both hands to a bare metal earth grounded surface. This will discharge any static charge which may have accumulated on the person doing the servicing.

(2) Whenever possible avoid touching any electrically conductive parts of the circuit module with your hands.

(3) Normally, circuit modules can be inserted or removed with power applied to the unit. However, check the INSTALLATION and MAINTENANCE sections of the manual as well as the module schematic diagram to insure there are no objections to this practice.

(4 When servicing a circuit module, avoid carpeted areas, dry environments, and certain types of clothing (silk, nylon, etc.) because they contribute to static buildup.

(5) All electrically powered test equipment should be grounded. Apply the ground lead from the test equipment to the circuit module before connecting the test probe. Similarly, disconnect the test probe prior to removing the ground lead.

(6) If a circuit module is removed from the system, it is desirable to lay it on a conductive surface (such as a sheet of aluminum foil) which is connected to ground through a resistance of approximately 100k.

WARNING

If the aluminum foil is connected directly to ground, be cautious of possible electrical shock from contacting the foil at the same time as other electrical circuits.

(7) When soldering, be sure the soldering iron is grounded.

(8) Prior to connecting jumpers, replacing circuit components, or touching CMOS pins (if this becomes necessary in the replacement of an integrated circuit device), be sure to discharge any static buildup as described in procedure 1. Since voltage differences can exist across the human body, it is recommended that only one hand be used if it is necessary to touch pins on the CMOS device and associated board wiring.

(9) When replacing a CMOS integrated circuit device, leave the device in its metal rail container or conductive foam until it is to be inserted into the printed circuit module.

(10) All low impedance test equipment (such as pulse generators, etc.) should be connected to CMOS device inputs after power is applied to the CMOS circuitry. Similarly, such low impedance equipment should be disconnected before power is turned off.

(11) Replacement modules shipped separately from the factory will be packaged in a conductive material. Any modules being transported from one area to another should be wrapped in a similar material (aluminum foil may be used). NEVER USE NONCONDUCTIVE MATERIAL for packaging these modules.

"DIGITAL PRIVATE-LINE" DECODER BOARD TROUBLESHOOTING CHART

NOTES:

1. To obtain a test code for the following procedure apply a carrier frequency signal to the receiver rf input from an rf signal generator modulated by the code output of a Motorola SLN6413A "Digital Private-Line" Test Set. Be sure the signal generator is able to accept very low frequency modulation (less than ±5 Hz).
2. Before you replace U801, use the following procedure to verify that U801 is malfunctioning:
   a. Connect U801-11 to the code input of a Motorola SLN6413A "Digital Private-Line" Test Set.
   b. Apply a carrier-frequency signal to the receiver rf input from a signal generator that is modulated by the code output of the test set.

   If proper decode is indicated, U801 must be replaced. If U801 must be replaced, refer to the CMOS handling precautions.

SYMPTOM	PROBABLE CAUSE	ACTION
No decode, but received audio is good when PL is disabled.	1. Audio squelch is malfunctioning.	Remove the decoder board. Apply +9.6 V at P201-3 on audio & squelch board. If audio is not enabled, troubleshoot audio & squelch circuits.
	2. No 50 kHz clock	Check U801-4 for 50 kHz clock pulses. Rise time must be ≤750 n sec.
	3. Audio enable switch is malfunctioning.	If U801-7 is high, but circuit board pin 5 is low when receiving code, replace Q810.
	4. Dump pin U801-1 is always high.	Check U801-1 should always be 0 V.
	5. Wrong or bad code plug.	Replace with a known good code plug. Check U801-15 through U801-23 for proper octal code.
	6. No data into U801.	Check U801-11 for 0 - 6 V pulses. If pulses are not present, check Q806 and U802 operation.
	7. Transmit code enable input is high.	Ground U801-9. If a received code is properly decoded, check for a malfunction in the delayed transmit enable circuit on the encoder board.
	8. U801 has an internal malfunction.	If, after checking causes 1 through 7, the cause of the problem has not been isolated, replace U801. CAUTION U801 is a CMOS device and may be damaged by improper handling. Refer to the CMOS handling precautions in this instruction section.
Excessive decoder falsing when monitoring an inactive channel (noise falsing).	1. Precision current source is low or inoperative.	Measure the dc voltages in the precision current source circuits. Current to U801-8 = (V_{BE} of Q808) (R825 + R826 +RT802)/ R826 (R825 + RT802)
	2. Current source disable switch is always on.	Check for 8 - 10 V at Q809 collector. If Q809 collector is 0 V, replace Q809.
	3. Improper 140 Hz low pass filter response.	Check dc voltages in filter circuit. Check the filter frequency response. Measured at Q803 emitter, the filter response should be -1.0 to -4.0 dB at 134 Hz and -12 to -15 dB at 250 Hz with 50 mV rms signal at decoder input.
	4. U802 supply voltage is too high.	Check U802-10 for +10.4 V ±0.2 V dc. If voltage is high, troubleshoot the +10.4 V regulator on the decoder board.
Excessive squelch tails (approx. 500 msec noise burst) at ends of received transmissions	1. Turn-off code not being transmitted by other radio unit.	Monitor circuit board pin 4 (DATA IN) for presence of turn-off code at ends of transmissions.
	2. U802 lock-in malfunction	Ground Q809 collector. With a 300 mV p-p signal at circuit board pin 4 (DATA IN), the waveform at U802-4 should be locked in to the input signal up to at least 175 Hz. If proper lock-in does not occur, replace C809, then check lock-in again. If lock-in is still bad, replace U802.
	3. U801 turn-off code detector is malfunctioning.	Check U801 (Note 2).
Poor detector sensitivity in poor quieting conditions	1. Improper 140 Hz low pass filter response response.	Check dc voltages in filter circuit. Check the filter frequency response; measured at Q803 emitter, the filter response should be -1.0 to -4.0 dB at 134 Hz and -12 to -15 dB at 250 Hz with 50 mV rms signal at decoder input.
	2. Precision current source supplying too much current to U802-8.	Measure the dc voltages in the current source circuits. Current to U802-8 = (V_{BE} of Q808) (R825 + R826 + RT802) R826 (R825 + RT802)
	3. Current source disable switch inoperative.	While detecting a valid code, check Q809 collector for 0 V dc. If 8-10 V is present, replace Q809.
Occassional squelch tail about 1 second after the end of a transmission from another radio	Current source disable switch is staying on too long.	Check Q809 collector. Q809 collector should go from 0 V dc to 8-10 V within 1.5 seconds after loss of audio squelch disable.

TECHNICAL CHARACTERISTICS

FREQUENCY DETERMINING DEVICE	"Vibrasponder" resonant reed
"PL" TONE FREQUENCY	Selected from 67-210 Hz range
TONE ACCURACY	±0.15%
TONE BANDWIDTH	Approximately 1 Hz
TONE SENSITIVITY	0.25 volt ac rms reed drive
OUTPUT	9.5 volts dc switched
POWER REQUIREMENT	9.6 volts dc @15 milliamperes

1. DESCRIPTION

This decoder provides a dc output voltage to unsquelch the receiver's audio section only when the proper PL tone is received. The decoder will respond only to a specific, continuous low-frequency tone from a transmitter in the same "Private-Line" network.

2. FUNCTIONAL OPERATION

2.1 GENERAL

2.1.1 "PL" Tone Present

2.1.1.1 The PL filter passes low frequency PL tones and attenuates signals above 300 Hz. The noise switch shorts out high frequency noise signals. The tone from the PL filter is limited to a fixed level by the amplifier/clipper and then applied to the "Vibrasponder" resonant reed which vibrates when the tone is the same frequency as the reed's resonant frequency. When the reed is vibrating, the tone is applied to a detector which develops a dc output which activates the output switch. When the output switch is activated, 9.5 volts is present at its output to enable the audio circuits. The output also activates the noise switch.

2.1.1.2 A separate high pass audio filter is located on the PL decoder board which allows voice signals above 300 Hz to pass but blocks PL tones. This filter is connected in series with the audio signal path to prevent the PL tone from being heard in the speaker.

2.1.2 "PL" Tone Absent

When no PL tone is present, the output switch is off. The output voltage is 0 volts at this time which inhibits the squelch circuit to prevent an audio output to the speaker. The noise switch is off at this time which allows high frequency noise to bypass the PL filter. The presence of high frequency noise desensitizes the amplifiers and acts as an "anti-falsing" feature to prevent a random low-frequency noise signal from activating the resonant reed.

2.2 DECODER INPUT CIRCUITS

2.2.1 The receiver discriminator output signal consists of noise only when no carrier signal is being received. With a carrier signal input to the receiver, the noise is reduced and voice audio or voice audio and PL tone added.

2.2.2 These input signals are routed through the low pass filter and noise gate circuit. A receiver input signal that is modulated ±0.05 kHz with PL tone produces a nominal 60 millivolts rms signal at the input to the decoder. The low pass filter consisting of L801, C802, C803 and C805 attenuates sharply all signals above 300 Hz. Thus, voice and noise signals above 300 Hz are blocked, but PL tones are passed. High pass filter C801, R803, and C807 presents a parallel path for high frequency noise whenever the decoder is not activated. This condition is desirable so that low frequency noise (only) will not falsely activate the decoder. When the proper tone has been received and the decoder is activated, noise switch Q807 acts as a short and grounds all high frequency signals before they reach amplifier Q801.

2.3 INPUT AMPLIFIER CIRCUITS

Amplifier Q801 amplifies noise and PL tone signals which are coupled to amplifier/clipper Q802. Diode CR801 and the base emitter junction of Q802 limit both the positive and negative swing of the signal to a maximum amplitude. The amplified output of Q802 provides a constant amount of drive even though the amount of PL tone deviation from various transmitters is not constant. It also limits the noise signals to prevent oversensitivity to noise signals which could falsely operate the "Vibrasponder" resonant reed. "Vibrasponder" driver Q803 operates as an emitter follower to provide current drive to the low impedance "Vibrasponder" resonant reed.

2.4 "VIBRASPONDER" RESONANT REED

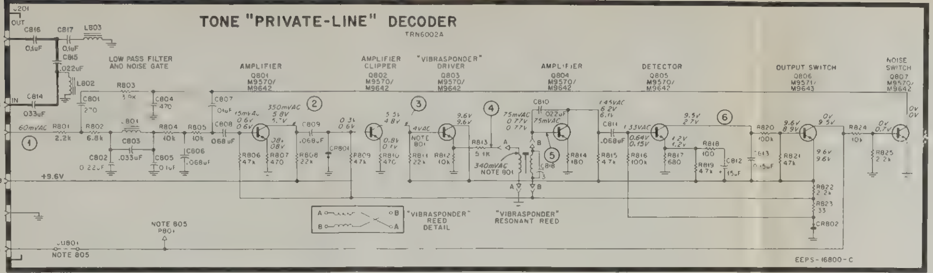
At resonance, the reed acts as a high Q transformer coupling energy from the primary to the secondary winding. At all other frequencies, the reed will not vibrate and no energy is coupled to the secondary winding.

2.5 OUTPUT CIRCUIT

When the proper PL tone is applied to the reed, it develops a sinusoidal wave output at its resonant frequency. This sinusoidal wave is amplified by Q804. Negative feedback through C810 maintains the sinusoidal waveform. The amplified signal is coupled to detector Q805 which converts the signal to a dc potential. Q805 is cut off with its collector voltage of 9.6 volts until the tone is applied. With tone applied, the positive most portion of the sinusoidal wave is clamped at approximately .6 volt. The positive swing of each cycle causes momentary conduction of Q805 and the collector voltage drops to near zero volts. C813 charges during the conduction period and discharges through R820 and R821 to develop a filtered dc potential which forward biases output switch Q806. With Q806 activated, 9.6 volts is gated to the output which unsquelches the receiver. Noise switch Q807 is also activated which places a short across the noise gate as explained in paragraph (b).

2.6 AUDIO FILTER

Audio and PL tone from the VOLUME control are routed through an audio filter consisting of C814-C817 and L802 and L803. The filter is electrically separate from the decoder but physically mounted on the same board. This filter is high-pass type which blocks the PL tone and passes the audio to the audio & squelch board.



TONE "PRIVATE-LINE" DECODER
TRN6002A
LOW PASS FILTER AND NOISE GATE
AMPLIFIER Q801 M9570/M9642
AMPLIFIER CLIPPER Q802 M9570/M9642
"VIBRASPONDER" DRIVER Q803 M9570/M9642
AMPLIFIER Q804 M9570/M9642
DETECTOR Q805 M9570/M9642
OUTPUT SWITCH Q806 M9571/M9643
NOISE SWITCH Q807 M9570/M9642
"VIBRASPONDER" REED DETAIL
"VIBRASPONDER" RESONANT REED
NOTE 805
P801
JU801
NOTE 805
+9.6V
EEPS-16800-C

NOTES

801 DUE TO SQUARE WAVE CHARACTERISTIC SOME METERS RESPOND DIFFERENTLY VOLTAGE SHOULD BE MEASURED WITH AN OSCILLOSCOPE.

802 AC VOLTAGE READINGS ARE RMS VALUES WITH 60 MILLIVOLTS "PL" TONE INPUT USE HIGH IMPEDANCE (10 MEGOHM) AC VOLTMETER MEASUREMENT MADE WITH RESPECT TO CHASSIS GROUND.

803 DC VOLTAGE READINGS TAKEN WITH HIGH IMPEDANCE (11 MEGOHM) DC VOLTMETER TOP VALUE IS MEASURED WITHOUT "PL" TONE BOTTOM VALUE IS MEASURED WITH 60 MILLIVOLTS "PL" TONE INPUT MEASUREMENT MADE WITH RESPECT TO CHASSIS GROUND.

804 UNLESS OTHERWISE STATED RESISTOR VALUES ARE IN OHMS, CAPACITOR VALUES ARE IN PICOFARADS

805 JUMPER JU801 AND P801 ARE INCORPORATED IN MODEL TRN6002A ONLY. JU801 IS REMOVED AND P801 IS USED ONLY FOR CERTAIN OPTIONAL EQUIPMENT

TONE "PRIVATE-LINE" DECODER

MODEL TRN6002A

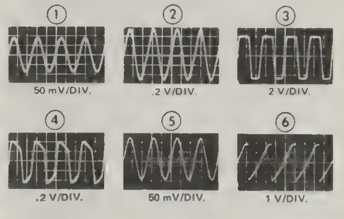
FUNCTION --

Unsquelches receiver upon receipt of proper "Private-Line" tone.

WAVEFORMS MEASURED UNDER FOLLOWING CONDITIONS

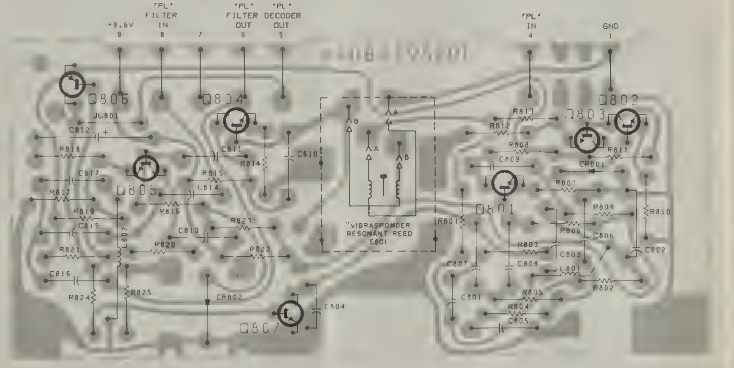
1. VERTICAL SENSITIVITY SHOWN UNDER EACH WAVEFORM
2. HORIZONTAL DEFLECTION = 5 msec/DIV.
3. WITH RECEIVER OPERATING PROPERLY
   - A INJECT 1000 uV RF CARRIER AT ANTENNA CONNECTOR
   - B MODULATE CARRIER WITH "PL" TONE ADJUST MODULATION FOR WAVEFORM ①, I E 60 mV rms (170 mV P-P) AT J201 2
4. RECEIVER NOT USED
   - A INJECT "PL" TONE AT J201 2
   - B ADJUST TONE LEVEL FOR WAVEFORM ①
5. OSCILLOSCOPE VERTICAL INPUT -- AC.
6. OSCILLOSCOPE SYNC INTERNAL
7. MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND

TONE "PL" DECODER WAVEFORMS



EPS-6182 C

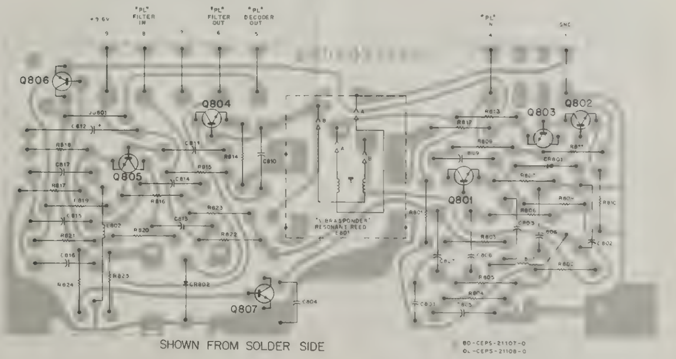
EARLIER VERSION



SHOWN FROM SOLDER SIDE

OL-CEPS-16802-B

LATER VERSION



SHOWN FROM SOLDER SIDE

MAINTAINANCE

a. Recommended Test Equipment

(1) Motorola R1010 Series RF Signal Generator. This solid-state unit provides receiver rf carrier signals.

(2) Motorola SLN6221A "PL" Tone Generator and "Vibrasender" resonant reed on the same frequency as the "Vibrasponder" resonant reed of the decoder. An audio signal generator may be used if it is accurately set to the decoder frequency. However, to obtain the accuracy necessary, the frequency should be adjusted while the signal is measured on a frequency counter.

(3) Motorola Solid-State Oscilloscope for tone signal measurement. Some measurements may be taken with a high impedance ac voltmeter.

(4) Motorola Solid-State DC Multimeter for dc voltage measurements.

b. Performance Tests

A 0.25 microvolt rf carrier signal modulated ±0.5 kHz with PL tone should unsquelch the receiver. This can be checked as follows:

(1) Connect the rf signal generator to the receiver rf input receptacle. Set the signal generator to the receiver carrier frequency, then set the output to minimum.

(2) Modulate the signal generator output ±0.5 kHz with a PL tone of the frequency stamped on the "Vibrasponder" resonant reed. The tone can be generated with a Motorola SLN6221A "PL" Tone Generator and a "Vibrasponder" resonant reed. The "Vibrasender" reed from the PL encoder may be used if it is the proper frequency.

(3) Also modulate the signal generator with an audio tone in the 300 to 3000 Hz range at ±3.3 kHz.

(4) Increase the output of the signal generator until the receiver unsquelches and the audio tone is heard on the speaker. No more than 0.25 microvolt should be required to unsquelch the receiver.

c. Troubleshooting

If the PL decoder does not operate, or operates improperly, the following hints may be helpful in locating the malfunction.

(1) Testing the "Vibrasponder" Resonant Reed

One of the first tests should be a check of the "Vibrasponder" resonant reed. Inject a 340 millivolt rms PL tone of the proper frequency directly to the primary of the reed. Use an oscilloscope or ac voltmeter to check the output across the secondary of the reed. Approximately 75 millivolts rms should be measured. If the reed is good, continue with other decoder tests.

(2) Decoder Testing

To test the decoder, inject a 1000 microvolt carrier signal into the receiver. Adjust PL modulation for 60 millivolts rms tone signal at the input to the decoder (test point ① on the schematic diagram and circuit board detail). If the PL tone is injected directly into the decoder for testing, an rf carrier signal should be injected into the receiver to quiet the receiver noise. Otherwise, noise and PL tone will both be present and will produce erroneous readings.

With 60 millivolts PL tone input, measure signal and dc voltages at various points in the decoder to isolate the trouble. Typical values for a normally operating decoder are given on the schematic diagram. Some waveforms are not sinusoidal and should be measured with an oscilloscope. Most ac voltmeters are calibrated to read accurately only for sinusoidal signals.

If under normal operating conditions, the PL tones are heard with the speaker audio, the high pass filter on the decoder board should be checked.

NOTE

The "PL" decoder can be removed from its normal position in the receiver chassis and plugged on the front or circuitry side of the audio board. Parallel-connected pins have been provided for ease of servicing. Remove the audio board shield for access to these pins.

ARDWARE KIT

EPS-21031-O

RECEIVER SHIELD

TLN1435B

PARTS LIST

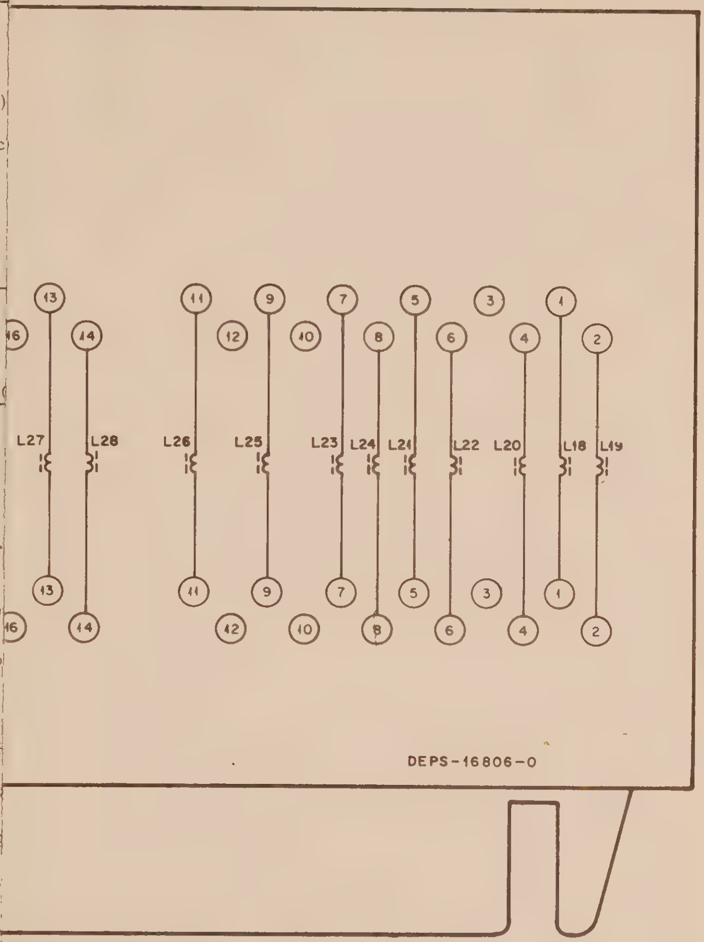
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

TLN4740B Board & Panel Kit (p/o TLN1435B) PL-3285

		CAPACITOR, fixed:
C33 thru 82	21-82543H01	1500 pF ±20%; 500 V; coded YEL-VIO-BRN
C83,84	21-82543H05	470 pF ±20%(YEL-VIO-BRN)
		COIL, RF: choke;
L18, 19, 21, 22, 23, 24, 36, 37, 40, 41	24-83977B01	1-1/2 turns thru ferrite bloc
L20, 25 thru 35, 38, 39, 42, 43	24-83961B01	3 turns over ferrite bead; coded BRN

TLN4738A Filter Chassis and Hardware Kit PL-3547-(

	43-83281F01	BUSHING; 2 req'd.
	27-84171D01	CHASSIS, filter
	15-84169D01	COVER, filter
	14-84173D01	INSULATOR, filter cable
	4-8412	LOCKWASHER #4 split; 10 r
	4-7607	WASHER, flat .125-.281 x . 4 req'd.
	3-134168	SCREW, tapping 4-40 x 1/4" Phillips; 2 req'd.
	3-134309	SCREW, tapping 4-40 x 3/16 Phillips; 12 req'd.
	3-114834	SCREW, machine 4-40 x 1"; 2 req'd.
	2-9627	NUT, 4-40 x 3/16" x 3/32" H 8 req'd.
	3-15728A24	SCREW, machine; 4-40 x 5/ 6 req'd.
	32-84410D01	SHIM, silicon, rubber; 4 req
	42-84431D01	CLAMP, flat wire
	42-84431D02	CLAMP, flat wire



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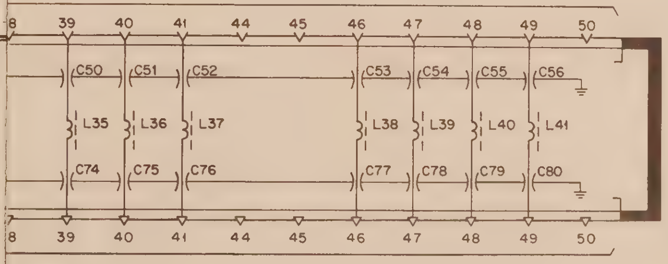
DEPS-16806-0

REVISIONS

EPS-25E14

CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
TLN1435B (TLN4740B-1)	C33 THRU C82	FROM 21-82543H01 1500 pF; ±20%, 500 V CODED YEL-VIO-BRN TO 21-82543H01; 1500 pF +100-0%; 500 V CODED BRN-GRN-RED	PARTS LIST
	C83, 84	FROM 21-82543H01 1500 pF; ±20%, 500 V CODED YEL-VIO-BRN TO 21-82543H05; 470 pF; ±20%; 500 V; CODED YEL-VIO-BRN	



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C80

EEPS-16805-A

service publications
1301 E. Algonquin Road, Schaumburg, IL 60196

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION

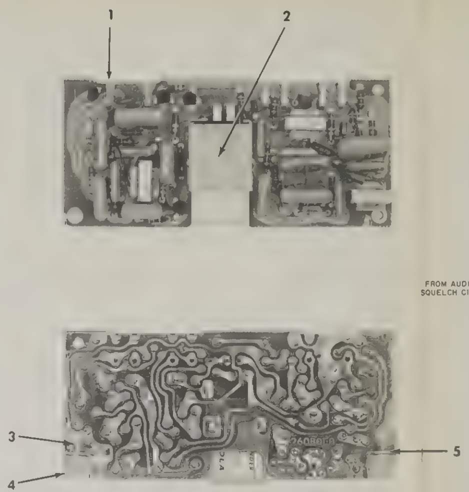
ELECTRICAL PARTS LIST

IMPORTANT

USE ONLY THE FOLLOWING MOTOROLA PART NUMBERS WHEN ORDERING REPLACEMENT PARTS

[illegible] Tone Private-Line Decoder [illegible]

[illegible]	[illegible]	CAPACITOR, [illegible]
E801	[illegible]	[illegible]
[illegible]	[illegible]	5 1K



AEPS-6105-O

MECHANICAL PARTS LIST

TRN6002A Tone Private-Line Decoder PL-3261-A

ITEM	MOTOROLA PART NO.	DESCRIPTION
1	9-83011H01	TERMINAL, pin: female: 6 req'd.
2	42-84116B01	SOCKET & CLAMP ASSY
3	3-136905	SCREW, [illegible] 4 x 5 [illegible], 2 req'd.
4	42-8421 [illegible]B01	RETAINER, Nylon: 2 req'd.
5	7-84223B01	BRACKET, retainer

NOTES

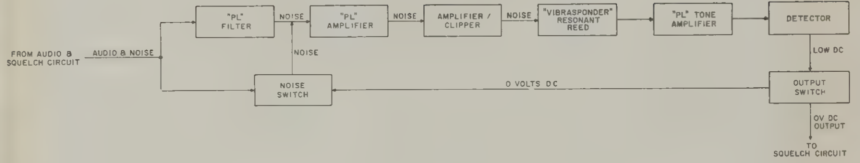
I. For optimum performance, replacement diodes and transistors must be ordered by Motorola part number.

II. The "Vibrasponder" Resonant Reed (Model TLN8381A) is not part of the decoder board. When ordering the complete board, the reed must be ordered separately.

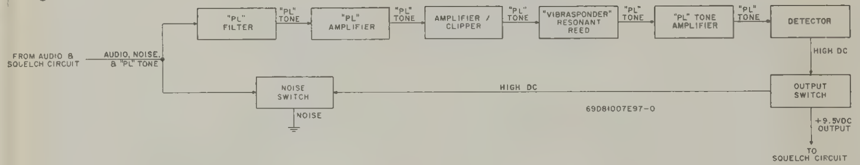
REVISIONS 68P81026E73-E

CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
TRN6002A	C804	FROM 21-82187B26 [illegible] μF ±10%; 100 V TO 21-821[illegible]B3[illegible] 470 μF ±10% [illegible]	Q801 BASE
	R803	FROM 6-124C[illegible] [illegible] ±[illegible] 1 W TO 6-124A[illegible] 3.9k ±5% [illegible] W	
	R813	FROM 6-124A65 4.7k ±[illegible] 1/4 W TO 6-124A66 5.1k ±5%. 1/4 W	Q803 EMIT-TER

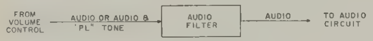
"PL" TONE ABSENT


FROM AUDIO & SQUELCH CIRCUIT
AUDIO & NOISE
"PL" FILTER
NOISE
"PL" AMPLIFIER
NOISE
AMPLIFIER / CLIPPER
NOISE
"VIBRASPONDER" RESONANT REED
"PL" TONE AMPLIFIER
DETECTOR
LOW DC
NOISE
NOISE SWITCH
0 VOLTS DC
OUTPUT SWITCH
OV DC OUTPUT
TO SQUELCH CIRCUIT

"PL" TONE PRESENT


FROM AUDIO & SQUELCH CIRCUIT
AUDIO, NOISE, & "PL" TONE
"PL" FILTER
"PL" TONE
"PL" AMPLIFIER
"PL" TONE
AMPLIFIER / CLIPPER
"PL" TONE
"VIBRASPONDER" RESONANT REED
"PL" TONE
"PL" TONE AMPLIFIER
"PL" TONE
DETECTOR
HIGH DC
NOISE SWITCH
NOISE
HIGH DC
OUTPUT SWITCH
+9.5VDC OUTPUT
TO SQUELCH CIRCUIT

69D81007E97-O


FROM VOLUME CONTROL
AUDIO OR AUDIO & "PL" TONE
AUDIO FILTER
AUDIO
TO AUDIO CIRCUIT

MAINTAINANCE

a. Recommended Test Equipment

(1) Motorola R1010 Series RF Signal Generator. This solid-state unit provides receiver rf carrier signals.

(2) Motorola SLN6221A "PL" Tone Generator and "Vibrasender" resonant reed on the same frequency as the "Vibrasponder" resonant reed of the decoder. An audio signal generator may be used if it is accurately set to the decoder frequency. However, to obtain the accuracy necessary, the frequency should be adjusted while the signal is measured on a frequency counter.

(3) Motorola Solid-State Oscilloscope for tone signal measurement. Some measurements may be taken with a high impedance ac voltmeter.

(4) Motorola Solid-State DC Multimeter for dc voltage measurements.

b. Performance Tests

A 0.25 microvolt rf carrier signal modulated ±0.5 kHz with PL tone should unsquelch the receiver. This can be checked as follows:

(1) Connect the rf signal generator to the receiver rf input receptacle. Set the signal generator to the receiver carrier frequency, then set the output to minimum.

(2) Modulate the signal generator output ±0.5 kHz with a PL tone of the frequency stamped on the "Vibrasponder" resonant reed. The tone can be generated with a Motorola SLN6221A "PL" Tone Generator and a "Vibrasponder" resonant reed. The "Vibrasender" reed from the PL encoder may be used if it is the proper frequency.

(3) Also modulate the signal generator with an audio tone in the 300 to 3000 Hz range at ±3.3 kHz.

(4) Increase the output of the signal generator until the receiver unsquelches and the audio tone is heard on the speaker. No more than 0.25 microvolt should be required to unsquelch the receiver.

c. Troubleshooting

If the PL decoder does not operate, or operates improperly, the following hints may be helpful in locating the malfunction.

(1) Testing the "Vibrasponder" Resona
Reed

One of the first tests should be a che of the "Vibrasponder" resonant reed. Inject a 340 millivolt rms PL tone of the proper frequency directly to the primary of the reed. Use an loscope or ac voltmeter to check the output acro the secondary of the reed. Approximately millivolts rms should be measured. If the reed is good, continue with other decoder tests.

(2) Decoder Testing

To test the decoder, inject a 1000 microvolt carrier signal into the receiver. Adjust PL modulation for 60 millivolts rms tone signal at the input to the decoder (test point ① on the schematic diagram and circuit board detail). If the PL tone is injected directly into the decod for testing, an rf carrier signal should be in into the receiver to quiet the receiver noise. Otherwise, noise and PL tone will both be prese and will produce erroneous readings.

With 60 millivolts PL tone input, measure signal and dc voltages at various point in the decoder to isolate the trouble. Typical ues for a normally operating decoder are given on the schematic diagram. Some waveforms are sinusoidal and should be measured with an oscilloscope. Most ac voltmeters are calibrated t read accurately only for sinusoidal signals.

If under normal operating conditions, the PL tones are heard with the speaker audio, the high pass filter on the decoder board should be checked.

NOTE

The "PL" decoder can be removed from its normal position in the receiver chassis and plugged on the front or circuitry side of the audio board. Parallel-connected pins have been provided for ease of servicing. Remove the audio board shield for access to these pins.

RECEIVER SHIELD

TLN1435B

TLN1435B MODEL COMPLEMENT		
MODEL	SUFFIX	DESCRIPTION
TLN4738A		FILTER CHASSIS & HARDWARE KIT
TLN4740B		BOARD & PANEL KIT

EPS-21031-O

PARTS LIST

TLN4740B Board & Panel Kit (p/o TLN1435B) PL-3285-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C33 thru 82	21-82543H01	1500 pF ±20%; 500 V; coded YEL-VIO-BRN
C83, 84	21-82543H05	470 pF ±20%(YEL-VIO-BRN)
		COIL, RF: choke;
L18, 19, 21, 22, 23, 24, 36, 37, 40, 41	24-83977B01	1-1/2 turns thru ferrite block
L20, 25 thru 35, 38, 39, 42, 43	24-83961B01	3 turns over ferrite bead; coded BRN

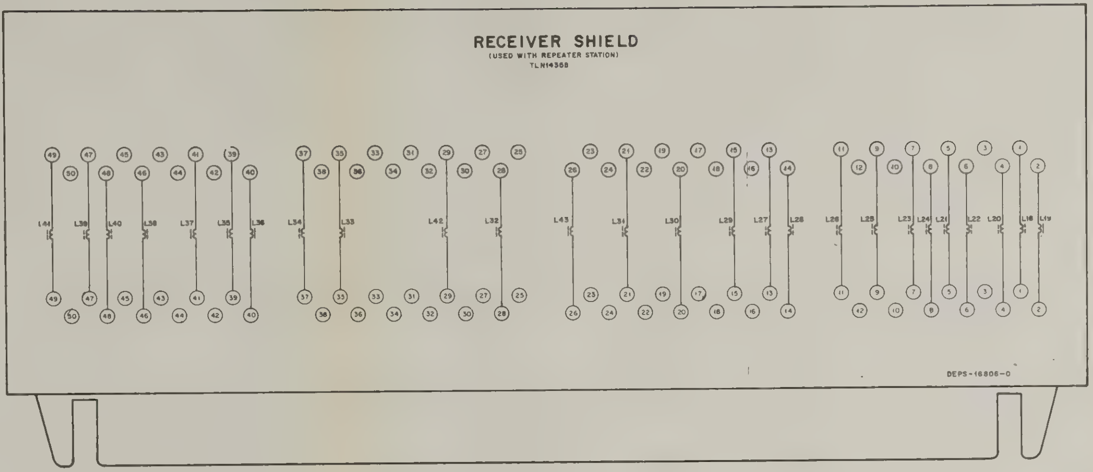
TLN4738A Filter Chassis and Hardware Kit PL-3547-0

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	43-83281F01	BUSHING; 2 req'd.
	27-84171D01	CHASSIS, filter
	15-84169D01	COVER, filter
	14-84173D01	INSULATOR, filter cable
	4-8412	LOCKWASHER #4 split; 10 req'd.
	4-7607	WASHER, flat .125-.281 x .027" 4 req'd.
	3-134168	SCREW, tapping 4-40 x 1/4", Phillips; 2 req'd.
	3-134309	SCREW, tapping 4-40 x 3/16", Phillips; 12 req'd.
	3-114834	SCREW, machine 4-40 x 1"; 2 req'd.
	2-9627	NUT, 4-40 x 3/16" x 3/32" Hex; 8 req'd.
	3-15728A24	SCREW, machine; 4-40 x 5/8"; 6 req'd.
	32-84410D01	SHIM, silicon, rubber; 4 req'd.
	42-84431D01	CLAMP, flat wire
	42-84431D02	CLAMP, flat wire

REVISIONS

EPS-25E14

CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
TLN1435B (TLN4740B-1)	C33 THRU C82	FROM 21-82543H01 1500 pF ±20%, 500 V CODED YEL-VIO-BRN TO 21-82543H01: 1500 pF +100-0%; 500 V CODED BRN-GRN-RED	PARTS LIST
	C83, 84	FROM 21-82543H01 1500 pF; ±20%, 500 V CODED YEL-VIO-BRN TO 21-82543H05: 470 pF; ±20%, 500 V; CODED YEL-VIO-BRN	


RECEIVER SHIELD
(USED WITH REPEATER STATION)
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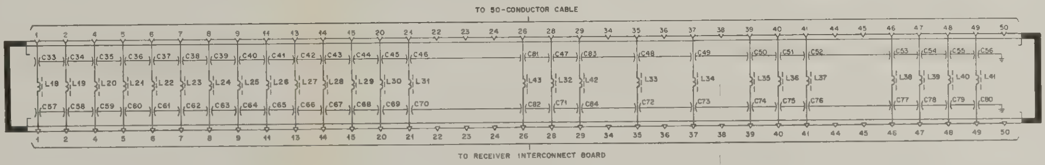
TO 50-CONDUCTOR CABLE
TO RECEIVER INTERCONNECT BOARD
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EEPS-16805-A

RECEIVER SHIELD

TNL1435B
(USED WITH REPEATER MODELS ONLY)
ALL CAPACITOR VALUES ARE 1500 pF

MOTOROLA INC.
Communications Division

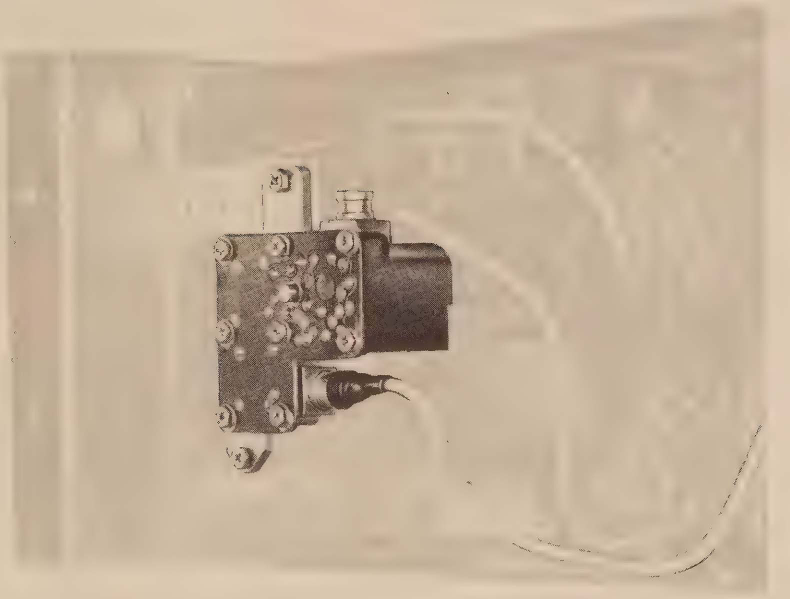
service publications
1301 E Algonquin Road Schaumburg, IL 60196

RF PREAMPLIFIER

MODELS TLD8421B AND TLD8422B

& CABLE

MODEL TKN6613A



AEPS-8824-O

MODEL	FREQUENCY
TLD8421B	132-150.8 MHz
TLD8422B	150.8-174 MHz

RECEIVER WITH PREAMPLIFIER

SENSITIVITY	-20 DB QUIETING	0.25 uV
	EIA SINAD	0.175 uV
SELECTIVITY (EIA SINAD)		-95 dB at ±30 kHz
INTERMODULATION (EIA SINAD)		-75 dB
SPURIOUS AND IMAGE REJECTION		-95 dB minimum
SQUELCH SENSITIVITY		Threshold 0.1 uV max. at 6 dB max. quieting
		Tight 0.6 uV max. at 14 dB min. quieting

TECHNICAL CHARACTERISTICS

IMPEDANCE	50 ohm input, 50 ohm output
CURRENT DRAIN	20 mA at 13.8V
FREQUENCY	132-174 MHz
POWER GAIN	10 dB

RF PREAMPLIFIER & CABLE

MOTOROLA INC. **Communications Division**
SERVICE PUBLICATIONS 1301 E. ALGONQUIN ROAD SCHAUMBURG, ILLINOIS 60172

1. DESCRIPTION

The rf preamplifier is an optional accessory item that increases the input signal level to the receiver thereby increasing its operating range. Using the rf preamplifier in two-receiver stations results in an increase greater than 3dB in input signal level to both receivers. (In stations using two receivers, the input signal level, without preamplifier, to each receiver is reduced by 3dB as compared to one-receiver stations. Two-receiver stations also require the use of the optional two-receiver coupler).

The preamplifier kit includes a printed circuit board, a housing and a coaxial cable with rf phono-type connectors. The circuit board is plated on both sides with components mounted toward the inside of the housing. The preamplifier circuit consists of two aperture-coupled helical resonators, an FET amplifier, and an output coil.

NOTE

The rf preamplifier is capable of amplifying two or more input carrier frequencies providing that the maximum center frequency separation does not exceed 1.5 MHz. If carrier frequency separation does exceed 1.5 MHz, two rf preamplifiers are required.

2. OPERATION

The incoming rf signal is applied to the preamplifier input jack J1 through the receiver input cable. The input jack is connected to a tap on coil L1. The rf signal is coupled from L1 to L2 by utilizing the cavities in the housing to form two aperture-coupled helical resonator cells. The tapped output of L2 is applied to common-gate FET amplifier Q1 through rf bypass capacitor C6. Resistor R2 develops dc bias. Output coil L3 provides loading for Q1 and is capacitively matched by capacitor C4 to output jack J2. This provides a 50-ohm termination for the input of the rf preselector.

3. MAINTENANCE

a. General

This section provides the maintenance shop type procedures for the rf preamplifier. These bench tests include measurements with a Motorola portable test set, and procedures for testing and troubleshooting.

b. Alignment

NOTE

If the preamplifier is normally operated with more than one carrier frequency input, determine the center of the preamplifiers operating range and, if possible, use this frequency to perform the alignment. If this is not possible, align the preamplifier using the lowest carrier frequency.

Disconnect the preamplifier input and output cables and bypass the preamplifier by connecting the receiver input cable directly to the rf preselector input. Check and align the preselector according to the alignment procedure described in the receiver section of the manual. After the receiver has been aligned, disconnect the receiver input cable from the preselector and reconnect the preamplifier input and output cables. While monitoring position 5, align the preamplifier for maximum meter indication by adjusting the tuning coils in the following order; L3, L2, L1. For final tuning, repeak L3, L2, and L1; then tune L2 for maximum quieting.

c. Realignment

It is not necessary to bypass the preamplifier when aligning to the same frequency or to a new frequency if it is within ±1.0 MHz of the previously tuned frequency. Align the rf preselector first, then adjust the preamplifier as described in the preceding paragraph.

d. Troubleshooting

With the preamplifier connected, and the test set on position 5, perform the following:

(1) Increase the signal generator output for a maximum indication on the test set meter (saturation), then decrease until a convenient reference point is reached on the test set meter (not more than 10 uA below the saturation point). Note both the test set meter indication and the signal generator output level setting.

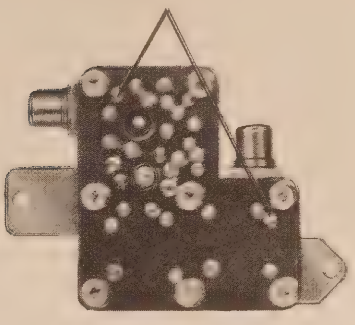
(2) Disconnect the preamplifier input and output cables and bypass the preamplifier by connecting the receiver input cable directly to the rf preselector input.

(3) Increase the signal generator output until the same reference point is obtained on the test set meter. Note the signal generator output level setting, it should be at least 3 times greater than the previous setting for a preamplifier gain of approximately 9-1/2 dB.

(4) Reconnect the preamplifier and check the alignment if the above indications are not obtained.

(5) If there is no output or insufficient gain after the preamplifier is aligned, check for faulty components or solder connections on the printed circuit board (refer to the circuit board removal and replacement illustration).

REMOVAL PROCEDURE
1. THOROUGHLY REMOVE SOLDER FROM INPUT AND OUTPUT FEEDTHRU LEADS.

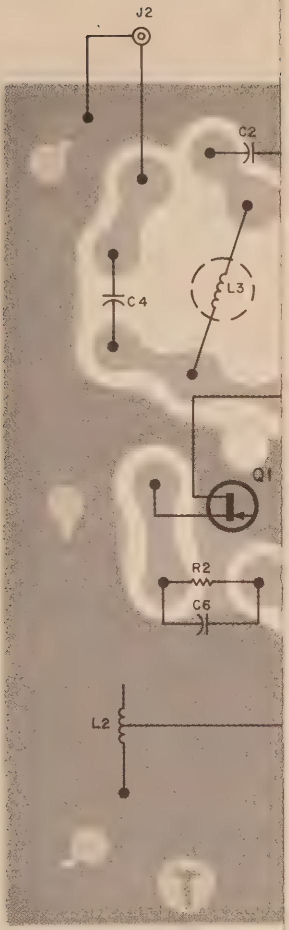


AEPS-8815-O

2. REMOVE 8 SCREWS AND LIFT OFF CIRCUIT BOARD.

REPLACEMENT PROCEDURE
3. REPLACE BOARD AND SECURE WITH SCREWS.
4. RESOLDER INPUT AND OUTPUT FEEDTHRU LEADS.

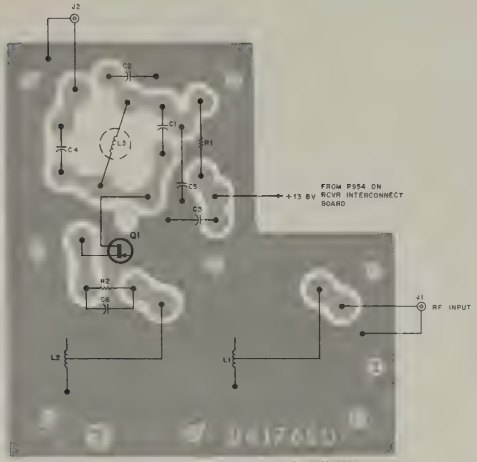
Preamplifier Circuit Board Removal and Replacement


J2
C2
C4
L3
Q1
R2
C6
L2

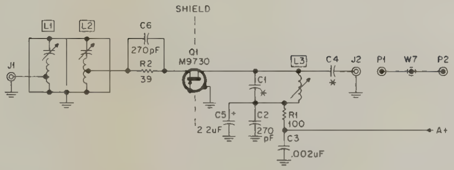
SHOWN FROM SOLDER

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

Receiver RF Preamplifier & Cable
Schematic Diagram & Circuit Board Detail
Motorola No. 63P81013E34-A
11/17/75-UP


J2
C2
C1
C4
L3
R1
C5
+13.8V
FROM P954 ON
RCVR INTERCONNECT
BOARD
C3
Q1
R2
C6
J1
RF INPUT
L2
L1
● COMPONENT SIDE
SOLDER SIDE
OL BEPS 8822 A
BD-BEPS-7407-0

SHOWN FROM SOLDER SIDE

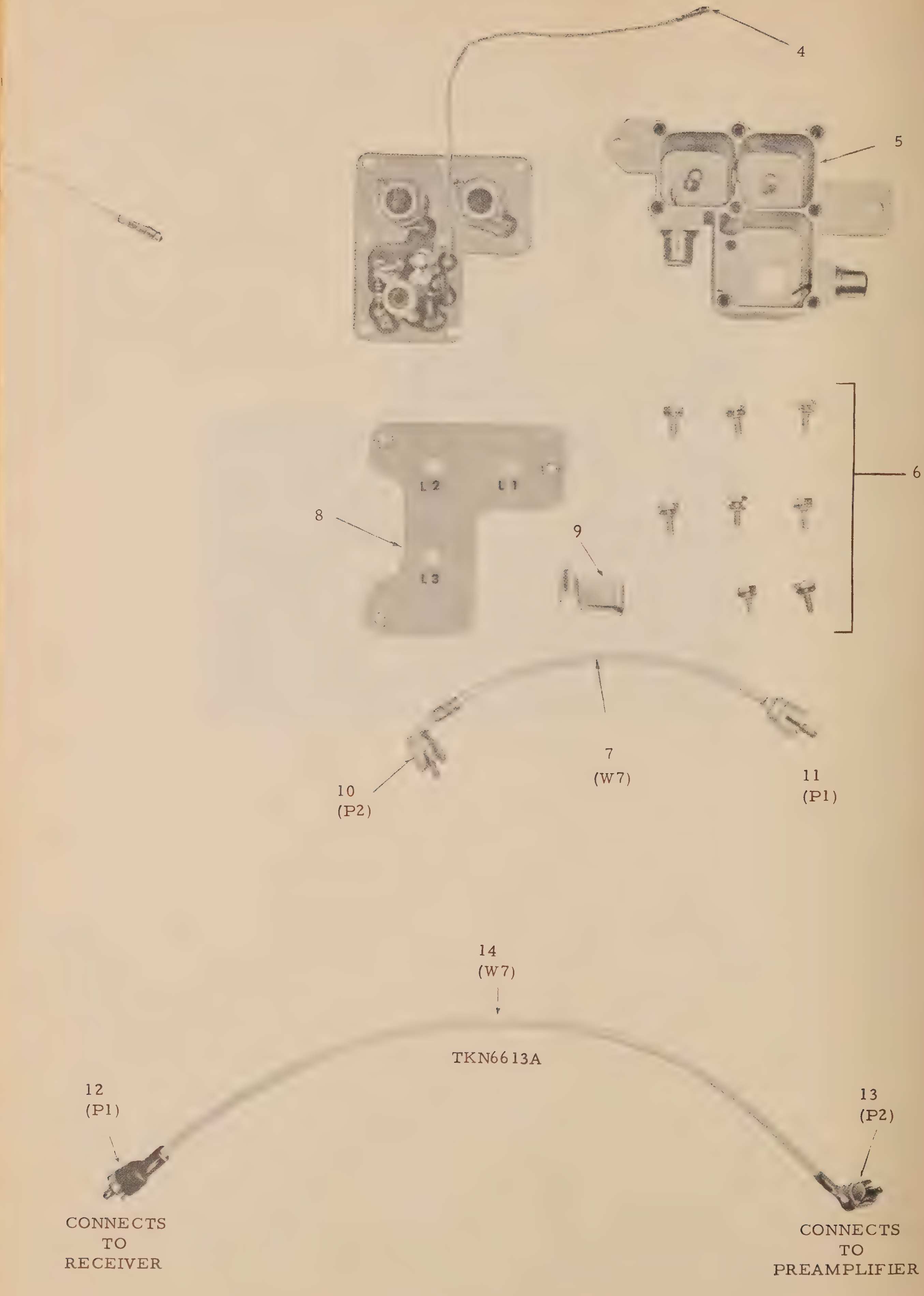

SHIELD
L1
L2
C6
270pF
R2
39
Q1
M9730
L3
C4
J2
P1
W7
P2
J1
C1
C5
C2
R1
100
2.2uF
270 pF
C3
.002uF
A+

BEPS-8825-0

*=SEE PARTS LIST FOR VALUE

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

Receiver RF Preamplifier & Cable
Schematic Diagram & Circuit Board Detail
Motorola No. 63P81013E34-A
11/17/75-UP


4
5
6
L2
L1
L3
8
9
7
(W7)
10
(P2)
11
(P1)
14
(W7)
TKN6613A
12
(P1)
13
(P2)
CONNECTS TO RECEIVER
CONNECTS TO PREAMPLIFIER

FAEPS-8814-B

2-RECEIVER COUPLER

MODEL TLN4758A

AEPS-9070-O

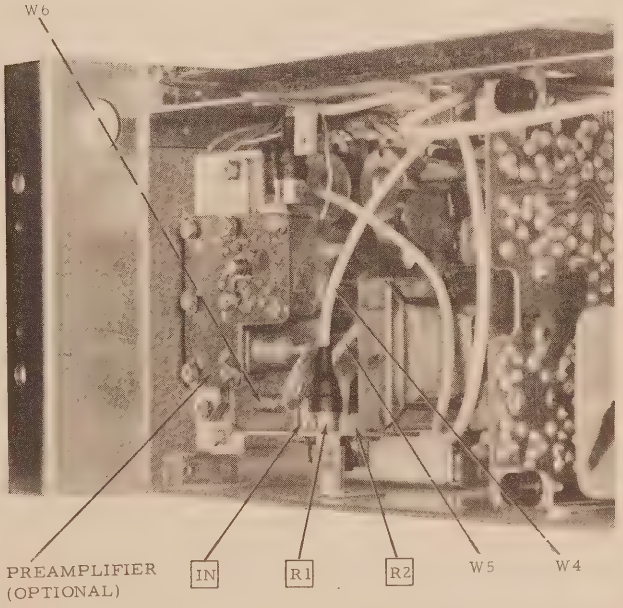
1. ELECTRICAL DESCRIPTION

This unit allows two receivers to operate from a single antenna source without interaction. It provides a correct impedance match between both receivers and the antenna source, and also provides isolation between the two receivers. Signal coupling and impedance matching is accomplished by utilizing two transformers and a resistor. A capacitor in the coupler partially cancels the circuit inductance and thereby makes the circuit appear resistive.

2. PHYSICAL DESCRIPTION

The 2-receiver coupler, consisting of a bracket which mounts the electrical components and three cables, is designed to mount in the first receiver chassis. When the coupler is used, the input to the receiver is disconnected and reconnected to the IN connector on the coupler. (If the receiver chassis contains a preamplifier, the output of this module is connected to the IN connector on the coupler.) Coupler cable W4 connects between the R1 coupler connector and the receiver module input connector. One end of coupler cable W5 is bulkhead-mounted in the rear receiver chassis wall and the other end of cable W5 mates with R2 coupler connector. Coupler cable W6 connects between the bulkhead-mounted connector on cable W5 and the input on the second receiver chassis.

On two-receiver stations with wide separation between frequencies and using the optional preamplifiers, a separate preamplifier is used with each receiver and the antenna coupler connects between the antenna source and the preamplifiers.



AEPS-9071-O

MOTOROLA INC.
Communications Division

service publications
1301 E. Algonquin Road, Schaumburg, IL 60196

ELECTRICAL PARTS LIST

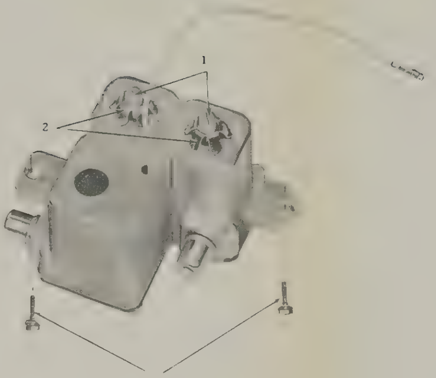
LEGEND
L - 132-150.8 MHz
H = 150.8-174 MHz

TLD8421B RF Preamplifier (132-150.8 MHz)
TLD8422B RF Preamplifier (150.8-174 MHz) PL-1474-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed
C1L	21-82133G40	3.9 pF ±0.25 pF; 500 V; NP0
C1H	21-83406D52	2 pF ±0.25 pF; 500 V; NP0
C2	21-82187B04	270 pF ±10%, 500 V
C3	21-83596E14	.002 uF ±10%, 200 V
C4L	21-83406D52	2 pF ±0.25 pF; 500 V; NP0
C4H	21-868487	1.5 ±0.25 pF, 500 V; NP0
C5	23-84762H04	2.2 uF ±20%; 25 V
C6	21-82187B04	270 pF ±10%; 500 V
		CONNECTOR, receptacle
J1, 2	9-84135B02	female; coaxial; miniature type
		COIL, RF
L1L	24-84418C01	tapped; coded BRN
L1H	24-84421B01	tapped; (not coded)
L2L	24-84418C02	tapped coded RED
L2H	24-84421B02	tapped, coded YEL
L3	24-84422B01	(not coded)
		CONNECTOR, plug
P1	28-82331G01	male, coaxial; miniature type
P2	28-82365D03	male, coaxial, right angle
P3	39-10184A24	female; single-contact (wire terminal)
		TRANSISTOR (SEE NOTE)
Q1	48-869730	field-effect; N-channel; type M9730
		RESISTOR, fixed
R1	6-129753	100 ±10%; 1/4 W
R2	6-185A15	39 ±5%; 1/8 W
		LINE, RF transmission
W7 (Used in Mobile radio applications only)	1-80760B68	includes P1, P2 and 30-83794G01 CABLE, RF coaxial; 4" length required

NOTE:

Replacement transistors must be ordered by Motorola part number only for optimum performance.



FBEPS-6486-C

MECHANICAL PARTS LIST

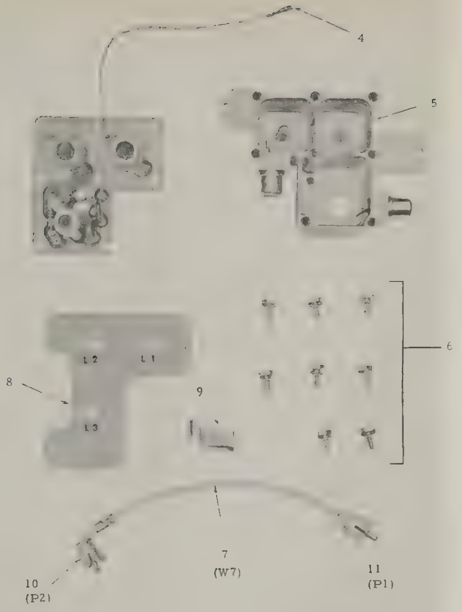
TLD8421B and TLD8422B RF Preamplifier
TLD8421A and TLD8422A RF Preamplifier PL-1035-G

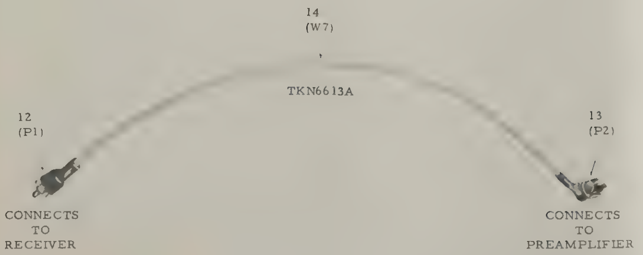
CODE	MOTOROLA PART NO.	DESCRIPTION
1	3S136923	SET SCREW, No. 10-32 x 1"; slotted head; 2 req'd
2	2B83677G01	LOCK NUT 2 req'd
3	3S134268	LOCKSCREW, tapping: No. 4-40 x 7/16" "Phillips" hex head; 2 req'd
4	39S10184A24	CONNECTOR, receptacle female
5	15D84416B01	HOUSING, preamplifier
6	3S136926	LOCKSCREW No. 4-40 x 5/16" "Phillips" hex head; 8 req'd
7	1V80760B68	CABLE ASSEMBLY
8	14B84192C01	INSULATOR, mylar
9	42B84816B01	CLIP, cable
10	28-82365D03	CONNECTOR, plug; right angle
11	28-82331C01	CONNECTOR, plug:phono type

= Used in Mobile Radio applications only

TKN6613A Cable Kit PL-3205-O

12 (P1)	28-82331G01	CONNECTOR, plug: phono type
13 (P2)	28-82365D03	CONNECTOR, plug: right angle
14 (W7)	30-83794C01	CABLE, coaxial: 13" req'd.





FAEPS-8814-B

2-RECEIVER COUPLER

MODEL TLN4758A

AEPS-9070-O

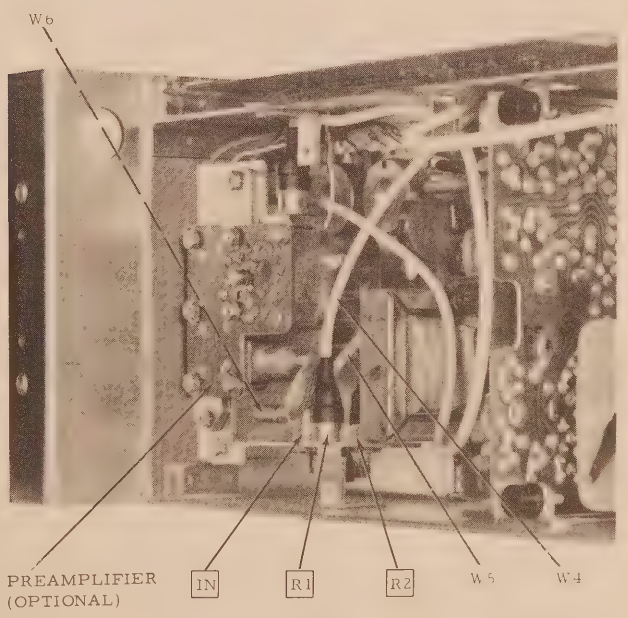
1. ELECTRICAL DESCRIPTION

This unit allows two receivers to operate from a single antenna source without interaction. It provides a correct impedance match between both receivers and the antenna source, and also provides isolation between the two receivers. Signal coupling and impedance matching is accomplished by utilizing two transformers and a resistor. A capacitor in the coupler partially cancels the circuit inductance and thereby makes the circuit appear resistive.

2. PHYSICAL DESCRIPTION

The 2-receiver coupler, consisting of a bracket which mounts the electrical components and three cables, is designed to mount in the first receiver chassis. When the coupler is used, the input to the receiver is disconnected and reconnected to the IN connector on the coupler. (If the receiver chassis contains a preamplifier, the output of this module is connected to the IN connector on the coupler.) Coupler cable W4 connects between the R1 coupler connector and the receiver module input connector. One end of coupler cable W5 is bulkhead-mounted in the rear receiver chassis wall and the other end of cable W5 mates with R2 coupler connector. Coupler cable W6 connects between the bulkhead-mounted connector on cable W5 and the input on the second receiver chassis.

On two-receiver stations with wide separation between frequencies and using the optional preamplifiers, a separate preamplifier is used with each receiver and the antenna coupler connects between the antenna source and the preamplifiers.



AEPS-9071-O

MOTOROLA INC.
Communications Division

service publications
1301 E. Algonquin Road, Schaumburg, IL 60196

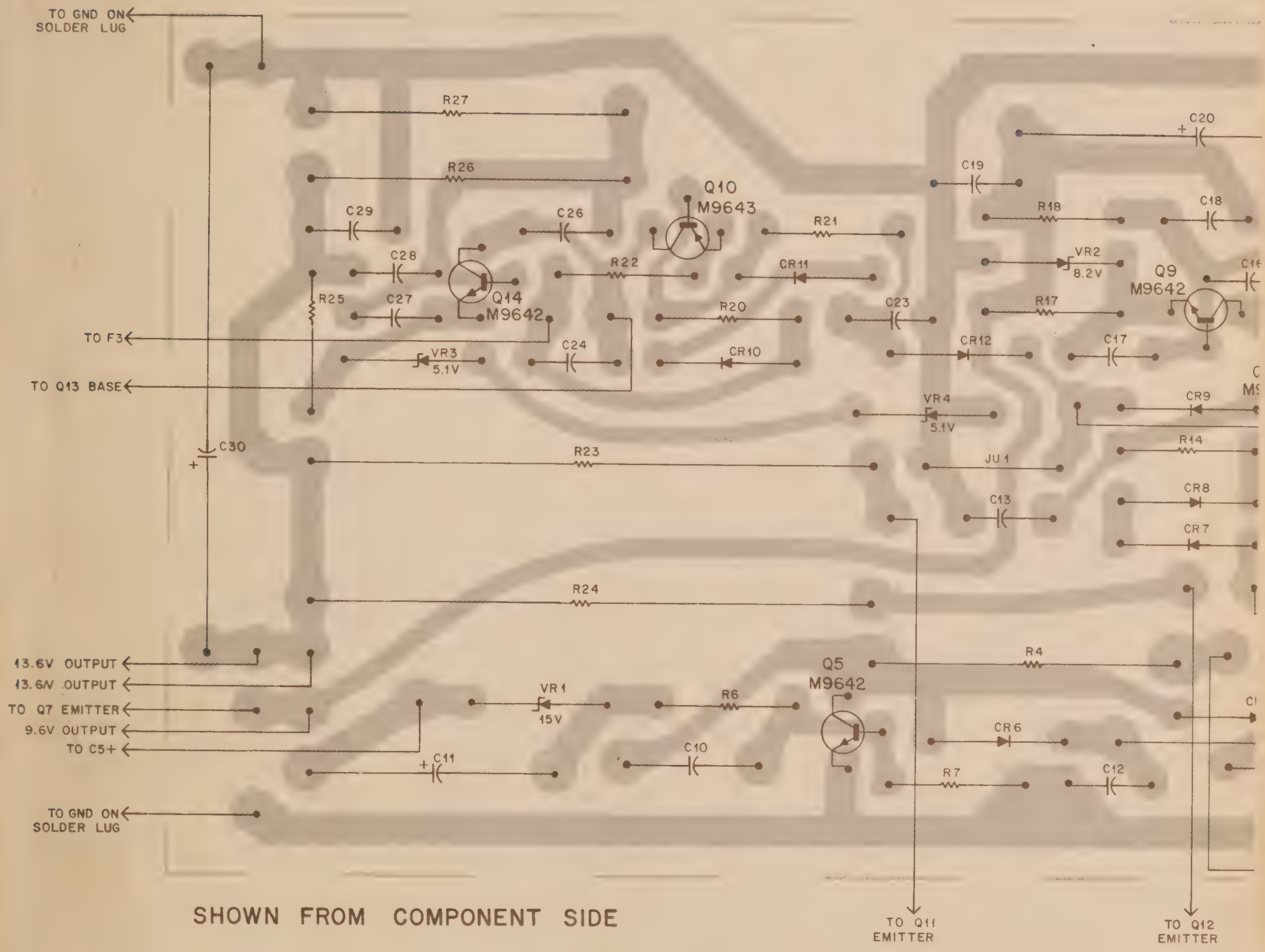
DESCRIPTION 68P81017E23
INSTALLATION 68P81015E19
UPRIGHT OUTDOOR CABINET 68P81033E42
"COMPA–STATION" OUTDOOR CABINET 68P81033E46
MAINTENANCE 68P81017E24
ANTENNA SWITCH & MISCELLANEOUS HARDWARE 68P81014E92
FILTERS AND DUPLEXERS 68P81102E85
METERING AND INTERCOM 68P81033E28
STATION HARDWARE KIT 68P81033E23

TRANSMITTER INTERCONNECT BOARD 68P81033E78
TRANSMITTER INTRODUCTION 68P81016E64
TRANSMITTER INTERCONNECT UNIT 68P81026E69
EXCITER 68P81026E66
90/100/110 WATT POWER AMPLIFIER 68P81026E67
60 WATT POWER AMPLIFIER 68P81015E12
POWER CONTROL BOARD 68P81015E07
SIMPLEX "DIGITAL PRIVATE–LINE" ENCODER 68P81028E63
DUPLEX "DIGITAL PRIVATE–LINE" ENCODER 68P81028E64
"PRIVATE–LINE" ENCODER 68P81026E71
TRANSMITTER SHIELD UNIT 68P81015E21
TRANSMITTER HARDWARE KITS 68P81016E57
"PRIVATE–LINE" DISABLE CABLE KIT 68P81026E77

RECEIVER INTRODUCTION 68P81026E76
RECEIVER INTERCONNECT BOARD 68P81034E07
RECEIVER INTERCONNECT UNIT 68P81026E72
RECEIVER RF & IF BOARD 68P81015E02
RECEIVER AUDIO & SQUELCH BOARD 68P81025E79
AUDIO POWER AMPLIFIER 68P81014E97
"DIGITAL PRIVATE–LINE" DECODER 68P81028E66
"PRIVATE–LINE" DECODER 68P81026E73
RECEIVER SHIELD UNIT 68P81025E14
RF PREAMPLIFIER & CABLE 68P81016E33
2–RECEIVER COUPLER 68P81016E62
RECEIVER HARDWARE KIT 68P81034E24

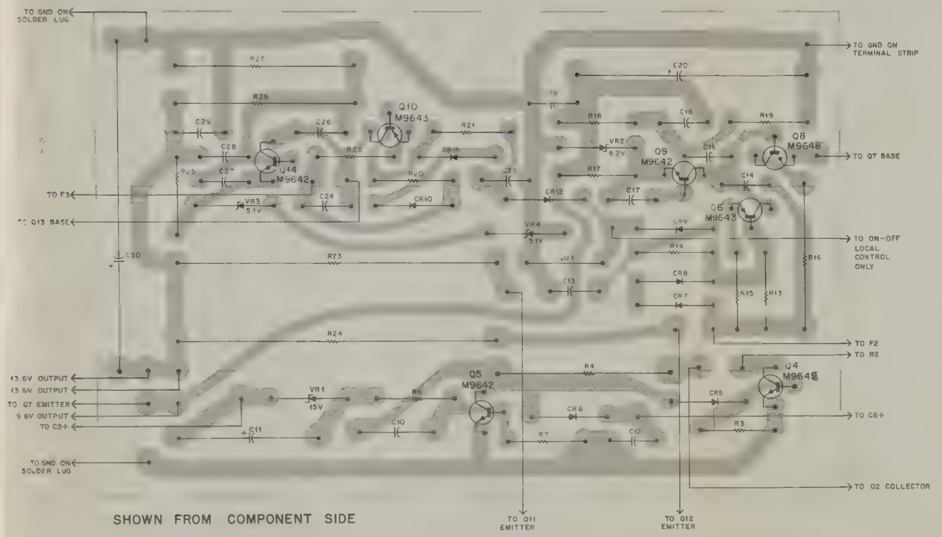
POWER SUPPLY 68P81033E41
POWER SUPPLY 68P81020E44

SCHEMATIC DIAGRAM AND ALIGNMENT PROCEDURE 68P81103E49
RF INTERCABLING SECTION (INTERMITTENT DUTY STATIONS) 68P81016E97
RF INTERCABLING SECTION (CONTINUOUS DUTY STATIONS) 68P81016E98
RF INTERCABLING SECTION (CONTINUOUS DUTY STATION WITH UNIFIED CONTROL CHASSIS 68P81034E06


TO GND ON SOLDER LUG
R27
R26
C29
C26
Q10
M9643
R21
C28
Q14
M9642
R22
CR11
R25
C27
R20
TO F3
VR3
5.1V
C24
CR10
TO Q13 BASE
C30
R23
R24
13.6V OUTPUT
13.6V OUTPUT
TO Q7 EMITTER
9.6V OUTPUT
TO C5+
VR1
15V
R6
Q5
M9642
C11
C10
TO GND ON SOLDER LUG
C20
C19
R18
C18
VR2
8.2V
Q9
M9642
C23
R17
CR12
C17
VR4
5.1V
CR9
R14
JU1
C13
CR8
CR7
R4
CR6
R7
C12
TO Q11 EMITTER
TO Q12 EMITTER

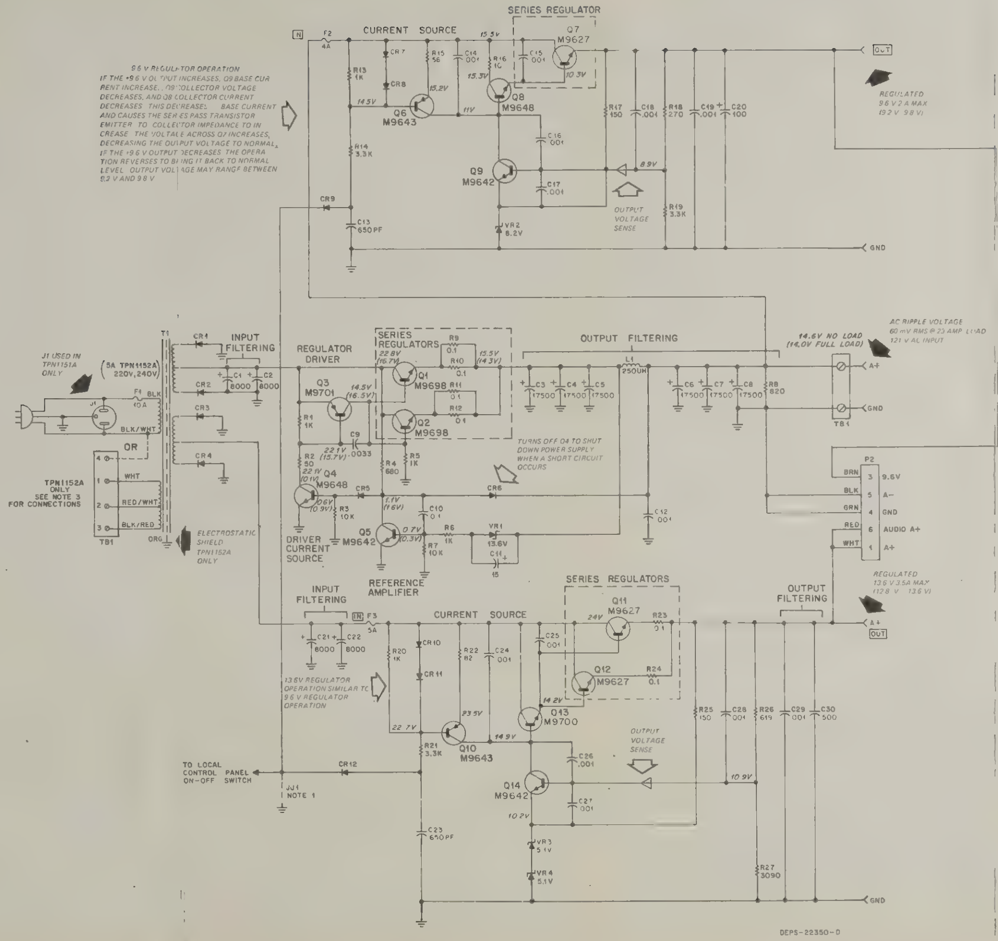
SHOWN FROM COMPONENT SIDE

BD-CEPS-2
OL-CEPS-2


TO GND ON SOLDER LUG
TO F3
TO Q13 BASE
13.6V OUTPUT
13.6V OUTPUT
TO Q7 EMITTER
9.6V OUTPUT
TO C5+
TO GND ON SOLDER LUG
TO GND ON TERMINAL STRIP
TO Q7 BASE
TO ON-OFF LOCAL CONTROL ONLY
TO F2
TO R2
TO C6+
TO Q2 COLLECTOR
TO Q11 EMITTER
TO Q12 EMITTER
Q10 M9643
Q14 M9642
Q9 M9642
Q8 M9648
Q6 M9643
Q5 M9642
Q4 M9648
R27
R26
R21
R23
R24
R16
R19
R17
R14
R15
R13
R4
R3
R7
C20
C29
C28
C26
C24
C18
C16
C17
C14
C13
C11
C10
C12
C30
VR1 15V
VR2 8.2V
VR3 5.1V
VR4 5.1V
CR8
CR7
CR5
CR6
CR10
CR12
JU1

SHOWN FROM COMPONENT SIDE

BD-CEPS-22351-O
OL-CEPS-22352-O


SERIES REGULATOR
CURRENT SOURCE
F2 4A
Q7 M9627
Q8 M9648
Q6 M9643
Q9 M9642
OUT
REGULATED 9.6 V 2 A MAX (9.2 V 9.8 V)
OUTPUT VOLTAGE SENSE
GND
INPUT FILTERING
REGULATOR DRIVER
SERIES REGULATORS
OUTPUT FILTERING
14.6V NO LOAD (14.0V FULL LOAD)
AC RIPPLE VOLTAGE 60 mV RMS @ 23 AMP LOAD 121 V AC INPUT
J1 USED IN TPN1151A ONLY
(5A TPN1152A) 220V,240V)
OR
TPN1152A ONLY SEE NOTE 3 FOR CONNECTIONS
TB1
ELECTROSTATIC SHIELD TPN1152A ONLY
Q3 M9701
Q1 M9698
Q2 M9698
Q4 M9648
Q5 M9642
L1 250UH
TB1
A+
GND
P2
BRN 3 9.6V
BLK 5 A−
GRN 4 GND
RED 6 AUDIO A+
WHT 1 A+
REGULATED 13.6 V 3.5A MAX (12.8 V 13.6 V)
DRIVER CURRENT SOURCE
REFERENCE AMPLIFIER
SERIES REGULATORS
Q11 M9627
Q12 M9627
Q13 M9700
Q10 M9643
Q14 M9642
OUTPUT FILTERING
TO LOCAL CONTROL PANEL ON-OFF SWITCH
JU1 NOTE 1
CEPS-22350-0

9.6 V REGULATOR OPERATION
IF THE +9.6 V OUTPUT INCREASES, Q9 BASE CURRENT INCREASES, Q9 COLLECTOR VOLTAGE DECREASES, AND Q8 COLLECTOR CURRENT DECREASES. THIS DECREASES BASE CURRENT AND CAUSES THE SERIES PASS TRANSISTOR EMITTER TO COLLECTOR IMPEDANCE TO INCREASE. THE VOLTAGE ACROSS Q7 INCREASES, DECREASING THE OUTPUT VOLTAGE TO NORMAL. IF THE +9.6 V OUTPUT DECREASES THE OPERATION REVERSES TO BRING IT BACK TO NORMAL LEVEL. OUTPUT VOLTAGE MAY RANGE BETWEEN 9.2 V AND 9.8 V

TURNS OFF Q4 TO SHUT DOWN POWER SUPPLY WHEN A SHORT CIRCUIT OCCURS

13.6V REGULATOR OPERATION SIMILAR TO 9.6 V REGULATOR OPERATION

POWER SUPPLY

MODELS TPN1151A AND TPN1152A

FUNCTION·

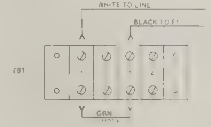
Provides regulated 9.6 V dc and two 13.6 V dc outputs from a 120 V, 60 Hz (TPN1151A), or 120, 220, 240 V, 50/60 Hz (TPN1152A) power input. All outputs are automatically adjusted for changes in load or input voltage.

NOTES

1 [illegible] MODELS OUT ON LOCAL CONTROL MODELS

2 UNLESS OTHERWISE STATED CAPACITOR VALUES ARE IN MICROFARADS RESISTOR VALUES ARE IN OHMS

3 TPN1151A 60 Hz 120 V AC SHOWN
TPN1152A 50/60 Hz 120 220 240 V AC
(CONNECTIONS AS FOLLOWS·


WHITE TO LINE
BLACK TO F1
TB1
GRN

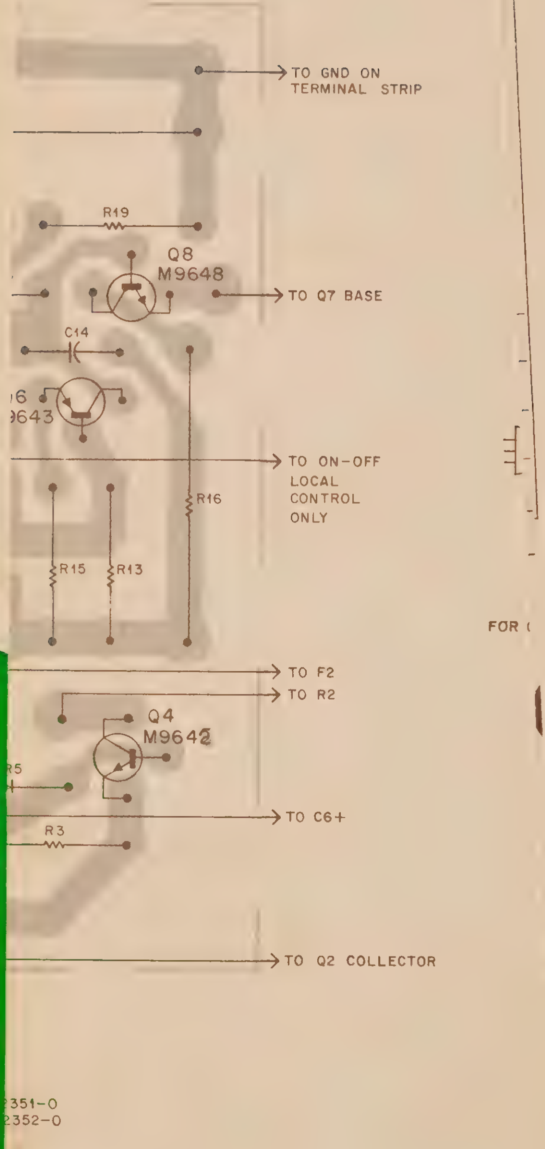
CONNECTIONS FOR 120 V AC
GRN JUMPER FROM TB1-1 TO TB1-4
WHITE LEAD TO TB1 4
BLACK LEAD TO TB1-3

220 V AC
GREEN JUMPER FROM TB1-3 TO TB1-4
WHITE LEAD TO TB1 2
BLACK LEAD NOT USED REMOVE

240 V AC
GREEN JUMPER FROM TB1-3 TO TB1-4
WHITE TO TB1-1
BLACK NOT USED REMOVE

PARTS LIST SHOWN
ON BACK OF THIS PAGE

68P81033E41-D
2/15/78- UP


TO GND ON TERMINAL STRIP
R19
Q8
M9648
TO Q7 BASE
C14
6
9643
TO ON-OFF LOCAL CONTROL ONLY
R16
R15
R13
FOR (
TO F2
TO R2
Q4
M9642
R5
TO C6+
R3
TO Q2 COLLECTOR
351-0
352-0

POWER SUPPLY

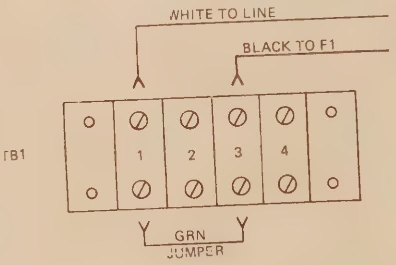
MODELS TPN1151A AND TPN1152A

FUNCTION-

Provides regulated 9.6 V dc and two 13.6 V dc outputs from a 120 V, 60 Hz (TPN1151A), or 120, 220, 240 V, 50/60 Hz (TPN1152A) power input. All outputs are automatically adjusted for changes in load or input voltage.

NOTES:

1. JU-1 IS IN ON REMOTE CONTROL MODELS, OUT ON LOCAL CONTROL MODELS.
2. UNLESS OTHERWISE STATED, CAPACITOR VALUES ARE IN MICROFARADS, RESISTOR VALUES ARE IN OHMS.
3. TPN1151A – 60 Hz 120 V AC SHOWN) TPN1152A – 50/60 Hz 120, 220, 240 V AC (CONNECTIONS AS FOLLOWS).


WHITE TO LINE
BLACK TO F1
TB1
1
2
3
4
GRN JUMPER

CONNECTIONS FOR 120 V AC: GRN JUMPER FROM TB1–1 TO TB1–4
WHITE LEAD TO TB1–4
BLACK LEAD TO TB1–3

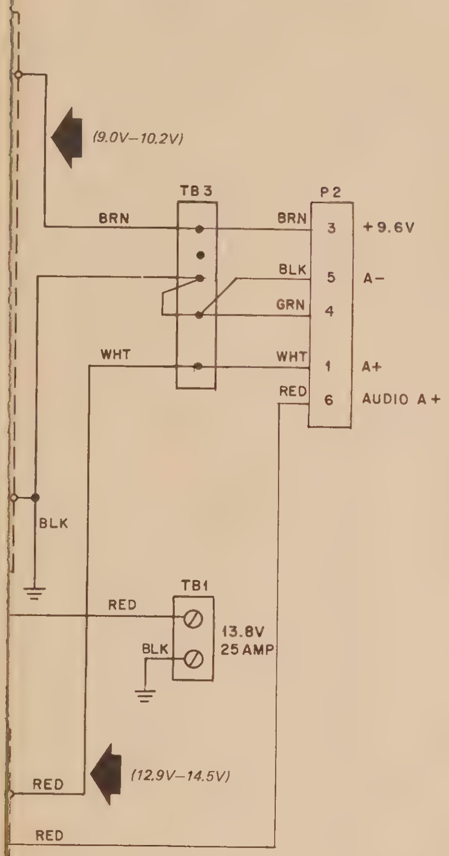
220 V AC: GREEN JUMPER FROM TB1–3 TO TB1– 4
WHITE LEAD TO TB1–2
BLACK LEAD NOT USED, REMOVE

240 V AC: GREEN JUMPER FROM TB1–3 TO TB1– 4
WHITE TO TB1–1
BLACK NOT USED, REMOVE

PARTS LIST SHOWN
ON BACK OF THIS PAGE

POWER SUPPLY

MODELS TPN1110A
TPN1110B


(9.0V–10.2V)
TB3
P2
BRN
BRN
3
+9.6V
BLK
5
A–
GRN
4
WHT
WHT
1
A+
RED
6
AUDIO A+
BLK
TB1
RED
BLK
13.8V
25 AMP
RED
(12.9V–14.5V)
RED

FUNCTION

Provides regulated 9.6 V dc and 13.6 V dc outputs and a 13.8 V dc unregulated output from a 121 V 60 Hz ac power input. 9.6 V and 13.6 V outputs are automatically adjusted for changes in load or input voltage.

Version	Cable
1	TKN6658A
1	TKN6658A

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

TRN6717A Power Supply Board PL-5033-C

		CAPACITORS, fixed, uf unless otherwise stated
C10	8-82905G30	0.1: ±10%: 50 V
C11	23-83214C02	15: ±20%: 20 V
C12	21-82187B14	.001: ±10%: 100 V
C13	21-848236	650 pF: ±5%: 300 V
C14 thru 19	21-82187B14	.001: ±10%: 100 V
C20	23-82601A25	100: -10+150%: 100 V
C23	21-848236	650: ±5%: 300 V
C24	21-82187B14	.001: ±10%: 100 V
C26 thru 29	21-82187B14	.001: ±10%: 100 V
C30	23-83210A23	500 +150 -10%: 25 V
		DIODES: (SEE NOTE)
CR5 thru 12	48-83654H01	silicon
		TRANSISTORS: (SEE NOTE)
Q4	48-869648	NPN: type M9648
Q5	48-869642	NPN: type M9642
Q6	48-869643	PNP: type M9643
Q8	48-869648	NPN: type M9648
Q9	48-869642	NPN: type M9642
Q10	48-869643	PNP: type M9643
		RESISTORS, fixed: ±10%, 1/4 W: unless otherwise stated
R3	6-124C73	10k
R4	6-127C45	680: 2 W
R5, 6	6-124C49	1k
R7	6-124C73	10k
R13	6-124C49	1k
R14	6-124C61	3.3k
R15	6-124C19	56
R16	6-126C01	10
R17	6-124C29	150
R18	6-124A35	270 ±5%
R19	6-124C61	3.3k
R21	6-124A61	3.3k ±5%
R22	6-124C23	82k
R23, 24	17-82177B50	.1: 7 W
R25	6-124C29	150
R27	6-82672B36	3090 ±1%
		VOLTAGE REGULATORS: (SEF NOTE)
VR1	48-82256C65	zener, 13.6 V
VR2	48-83461E32	zener, 8.2 V
VR3, 4	48-83461E23	zener, 5.1 V
MECHANICAL PARTS		
	1-80791B25	CIRCUIT BOARD, eyeleted includes:
	43-84594G01	STANDOFF

NOTE:

For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

TRN6718A Power Supply Chassis (60 Hz)
TRN6731A Power Supply Chassis (50 Hz) PL-5034-A

		CAPACITORS: fixed: uF unless otherwise stated
C1, 2	23-83093G13	8000: +150-10%: 35 V
C3 thru 8	23-83093G20	17500: +150-10%: 20 V
C9	21-82428B10	.0033: ±10%: 100 V
C21, 22	23-83093G13	8000: +150-10%: 35 V
C25	21-82187B14	.001: ±10%: 100 V
		DIODES: (SEE NOTE)
CR1, 2	01-80739B59	silicon
CR3, 4	48-82525G13	silicon
		FUSES:
F1	65-135105	10A
F2	65-61688	4A
F3	65-52293	5A
		COIL:
L1	25-84514G01	250 uH
		TRANSISTORS: (SEE NOTE)
Q1, 2	48-869698	NPN: type M9698
Q3	48-869701	PNP: type M9701
Q7, 11, 12	48-869627	NPN: type M9627
Q13	48-869700	NPN: type M9700
		RESISTORS: fixed: ±10%, unless otherwise stated
R1	6-125C49	1k: 1/2 W
R2	17-82177B20	50: 7 W
R8	6-124C47	820: 1/2 W
R9 thru 12	17-82177B50	1 7 W
R20	6-125C49	1k: 1/2 W
		TRANSFORMER, power
T1	25-82623L01	120 V AC: 60 Hz (TRN1151 only) primary: BLK-BLK (WHT = .377 ohms) secondary: RED-RED = .031 ohms, GRN-RED = .138 ohms
	or	
	25-82623L02	120 V AC 50 Hz (TRN1152 only) primary: WHT-BLK = 1 7 ohms secondary: RED-RED = .033 ohms, GRN-GRN = .152 ohms
MECHANICAL PARTS		
	1-80793B96	COVER ASSEMBLY includes:
	1-80790B99	COVER, riveted includes:
	15-82683L01	COVER, power supply
	3-136138	SCREW, tapping: #6-32 x 3/8": 4 used
	42-83123F01	RETAINER: 4 used
	1-80791B24	HEAT SINK ASSEMBLY includes:
	2-7005	NUT, hex:6-32 x 1/4" x 3/32": 4 used
	3-3398	SCREW, tapping: #6-20 x 3/8"
	3-488100	SCREW, machine: 6-32
	4-7569	WASHER, flat: .145-.312-.027": 4 used
	4-7650	WASHER, lock: #6 internal: 2 used
	4-7666	WASHER, lock: #6 external
	4-474216	WASHER, insulated: 4 used
	4-84496C01	WASHER, shoulder: 4 used
	14-865854	INSULATOR, transistor: 2 used
	26-84923B01	HEAT SINK
	29-5207	LUG, solder: #6: 2 used
	29-84499B01	LUG, transistor: 4 used
	42-10217A01	STRAP, cable harness
	1-80791B23	CHASSIS, power supply, riveted includes:
	4-8242	WASHER, flat: .094-.250-.027": 4 used
	9-84935D01	SOCKET, transistor: 3 used
	9-83662A01	SOCKET, transistor: 2 used
	31-121701	TERMINAL, strip: 5 pin
	27-82682L01	CHASSIS, power supply
	2-7005	NUT, hex: 6-32 x 1/4 x 3/32": 4 used (TRN6731A only)
	3-135664	SCREW, tapping: #6-32 x 9/16": 4 used (TRN6731A only)
	4-7669	WASHER, lock: #6 split: 4 used (TRN6731A only)
	29-812979	LUG, solderless: 4 used (TRN6731A only)
	29-847854	LUG, slotted tongue: (TRN6718A) 5 used (TRN6731A only)
	2-115123	NUT, hex: 10-32 x 3/8 x 1/8": 4 used
	2-119913	NUT, hex: 8-32 x 11/32 x 1/8": 2 used
	3-2957	SCREW, machine: 8-32 x 1/2": 2 used
	3-3360	SCREW, tapping: #6-20 x 1/2": 10 used
	3-7184	SCREW, machine: 6-32 x 1/2": 4 used
	3-134214	SCREW, tapping: #6-32 x 5/8"
	3-7257	SCREW, machine: 8-32 x 5/8": 4 used
	3-134214	SCREW, tapping: #6-32 x 5/8"
	3-136138	SCREW, tapping: #6-32 x 3/8": 2 used
	3-136140	SCREW, tapping: #8-32 x 5/8": 2 used
	3-138216	SCREW, tapping: #10-32 x 3/8": 4 used
	7-82737L01	BRACKET
	9-82083C01	RECEPTACLE, fuse: 3 used
	29-5321	LUG, soldering: #10
	30-858552	CABLE, battery: #12 black: 11 used
	30-858553	CABLE, battery: #12 red: 11 used
	30-83211C01	AC CORD and PLUG
	9-83238C02	OUTLET, AC: 3 prong (TRN6718A only)
	31-50378	TERMINAL, board
	31-82272B05	TERMINAL, board: 4 pin (TRN6731A only)
	54-83532H01	LABEL, caution

NOTE:

For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

REVISIONS

6BP81033E41-D

CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
TRN6717A-1	R18	FROM 6-124A31, 180 TO 6-124A35, 270	Q9 BASE

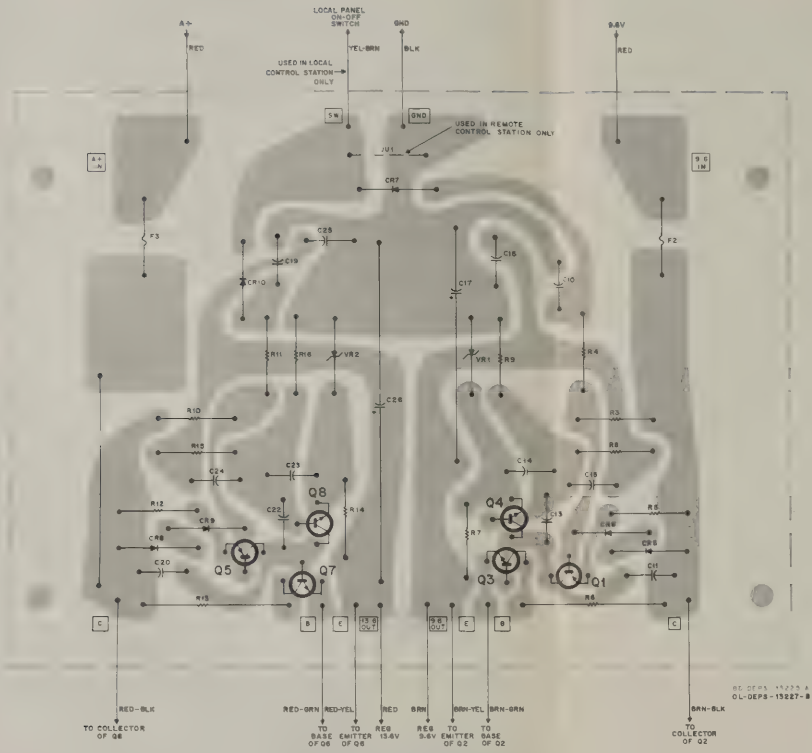
POWER SUPPLY

MODELS TPN1110A
TPN1110B

[redacted]

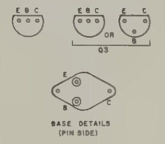
FUNCTION

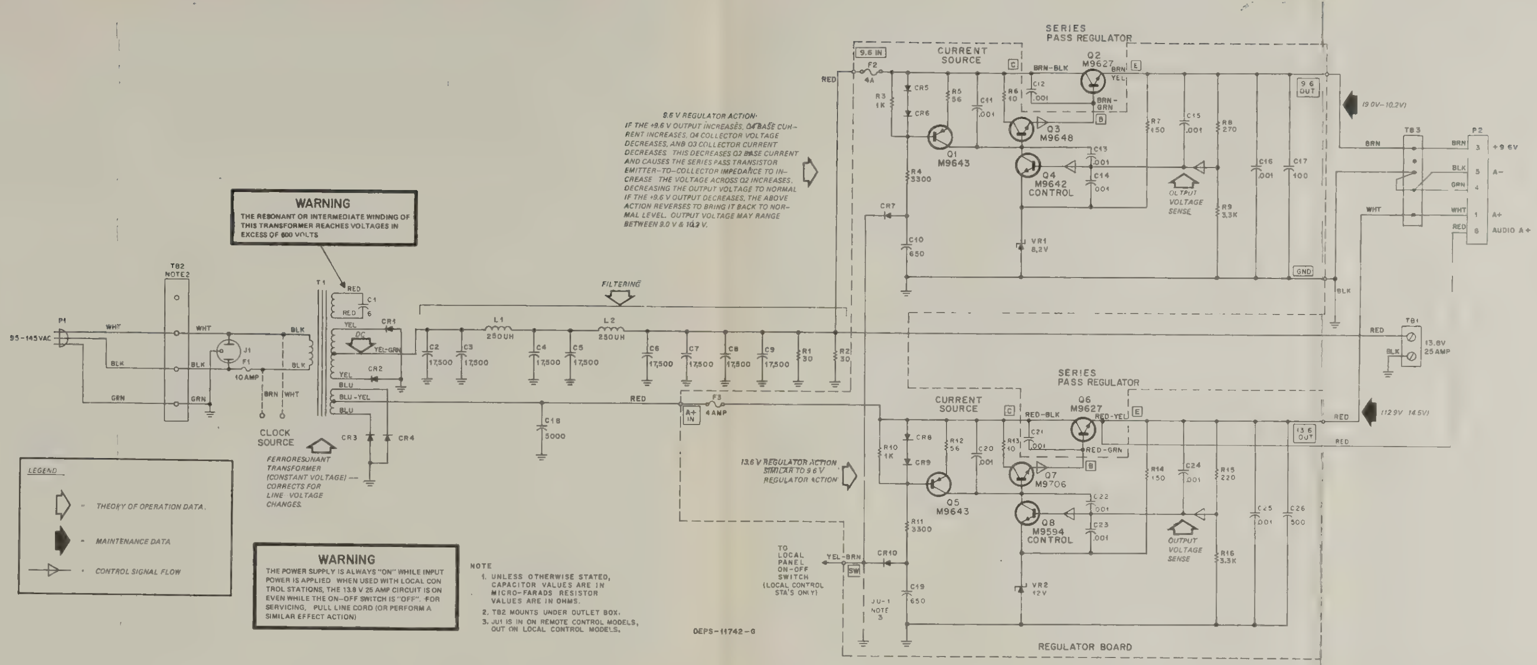
Provides regulated 9.6 V dc and 13.6 V dc outputs and a 13.8 V dc unregulated output from a 121 V 60 Hz ac power input. 9.6 V and 13.6 V outputs are automatically adjusted for changes in load or input voltage.


A+
RED
LOCAL PANEL ON-OFF SWITCH
GND
9.6V
USED IN LOCAL CONTROL STATION ONLY
YEL-BRN
BLK
SW
GND
USED IN REMOTE CONTROL STATION ONLY
JU1
CR7
A+ IN
9.6 IN
F3
F2
C25
C19
CR10
C17
C16
C10
R11
R16
VR2
VR1
R9
R4
C26
R10
R3
R13
R8
C23
C14
C24
C13
Q8
Q4
C22
R14
R7
R12
CR9
CR8
CR6
C20
Q5
Q7
Q3
Q1
R15
R6
C11
C
B
C
13.6 OUT
9.6 OUT
C
B
C
RED-BLK
RED-GRN
RED-YEL
RED
BRN
BRN-YEL
BRN-GRN
BRN-BLK
TO COLLECTOR OF Q6
TO BASE OF Q6
TO EMITTER OF Q6
REG 13.6V
REG 9.6V
TO EMITTER OF Q2
TO BASE OF Q2
TO COLLECTOR OF Q2
OL-DEPS-13227-B

SHOWN FROM COMPONENT SIDE

9.6V AND 13.6V REGULATOR BOARD


E B C
E B C
E C
OR
B
Q3
E
B
C
BASE DETAILS (PIN SIDE)


95-145VAC
P1
WHT
BLK
GRN
TB2 NOTE 2
J1
F1 10 AMP
BRN
WHT
CLOCK SOURCE
T1
RED
C1 6
YEL
DC
YEL-GRN
CR1
CR2
BLU
BLU-YEL
CR3
CR4
FILTERING
L1 250UH
L2 250UH
C2 17,500
C3 17,500
C4 17,500
C5 17,500
C6 17,500
C7 17,500
C8 17,500
C9 17,500
R1 30
R2 30
C18 5000
A+ IN
F3 4 AMP
F2 4A
9.6 IN
CURRENT SOURCE
SERIES PASS REGULATOR
Q2 M9627
Q1 M9643
Q3 M9648
Q4 M9642 CONTROL
VR1 8.3V
CR7
C10 650
OUTPUT VOLTAGE SENSE
9.6 OUT
GND
(9.0V-10.2V)
TB3
P2
+9.6V
A-
A+
AUDIO A+
TB1
13.8V 25AMP
(12.9V 14.5V)
13.6 OUT
Q6 M9627
Q5 M9643
Q7 M9706
Q8 M9594 CONTROL
VR2 12V
CR10
TO LOCAL PANEL ON-OFF SWITCH (LOCAL CONTROL STA'S ONLY)
JU-1 NOTE 3
REGULATOR BOARD
DEPS-11742-0

WARNING
THE RESONANT OR INTERMEDIATE WINDING OF THIS TRANSFORMER REACHES VOLTAGES IN EXCESS OF 600 VOLTS

FERRORESONANT TRANSFORMER (CONSTANT VOLTAGE) — CORRECTS FOR LINE VOLTAGE CHANGES.

9.6 V REGULATOR ACTION:
IF THE +9.6 V OUTPUT INCREASES, Q4 BASE CURRENT INCREASES, Q4 COLLECTOR VOLTAGE DECREASES, AND Q3 COLLECTOR CURRENT DECREASES. THIS DECREASES Q2 BASE CURRENT AND CAUSES THE SERIES PASS TRANSISTOR EMITTER-TO-COLLECTOR IMPEDANCE TO INCREASE. THE VOLTAGE ACROSS Q2 INCREASES, DECREASING THE OUTPUT VOLTAGE TO NORMAL. IF THE +9.6 V OUTPUT DECREASES, THE ABOVE ACTION REVERSES TO BRING IT BACK TO NORMAL LEVEL. OUTPUT VOLTAGE MAY RANGE BETWEEN 9.0 V & 10.2 V.

13.6 V REGULATOR ACTION SIMILAR TO 9.6 V REGULATOR ACTION.

LEGEND

⇨	THEORY OF OPERATION DATA.
➡	MAINTENANCE DATA
—▷—	CONTROL SIGNAL FLOW

WARNING
THE POWER SUPPLY IS ALWAYS "ON" WHILE INPUT POWER IS APPLIED. WHEN USED WITH LOCAL CONTROL STATIONS, THE 13.8 V 25 AMP CIRCUIT IS ON EVEN WHILE THE ON-OFF SWITCH IS "OFF". FOR SERVICING, PULL LINE CORD (OR PERFORM A SIMILAR EFFECT ACTION)

NOTE
1. UNLESS OTHERWISE STATED, CAPACITOR VALUES ARE IN MICRO-FARADS. RESISTOR VALUES ARE IN OHMS.
2. TB2 MOUNTS UNDER OUTLET BOX.
3. JU1 IS IN ON REMOTE CONTROL MODELS, OUT ON LOCAL CONTROL MODELS.

MODEL COMPLEMENT

Model	Version	Chassis & Hardware	Version	Regulator Board	Version	Cable
TPN1110A		TLN5123A		TLN5122A	1	TKN6658A
TPN1110B		TLN5123B		TLN5122A	1	TKN6658A

PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

DESCRIPTION . . . 68P81017E23
INSTALLATION . . . 68P81015E19
UPRIGHT OUTDOOR CABINET . . . 68P81033E42
"COMPA–STATION" OUTDOOR CABINET . . . 68P81033E46
MAINTENANCE . . . 68P81017E24
ANTENNA SWITCH & MISCELLANEOUS HARDWARE . . . 68P81014E92
FILTERS AND DUPLEXERS . . . 68P81102E85
METERING AND INTERCOM . . . 68P81033E28
STATION HARDWARE KIT . . . 68P81033E23

TRANSMITTER INTERCONNECT BOARD . . . 68P81033E78
TRANSMITTER INTRODUCTION . . . 68P81016E64
TRANSMITTER INTERCONNECT UNIT . . . 68P81026E69
EXCITER . . . 68P81026E66
90/100/110 WATT POWER AMPLIFIER . . . 68P81026E67
60 WATT POWER AMPLIFIER . . . 68P81015E12
POWER CONTROL BOARD . . . 68P81015E07
SIMPLEX "DIGITAL PRIVATE–LINE" ENCODER . . . 68P81028E63
DUPLEX "DIGITAL PRIVATE–LINE" ENCODER . . . 68P81028E64
"PRIVATE–LINE" ENCODER . . . 68P81026E71
TRANSMITTER SHIELD UNIT . . . 68P81015E21
TRANSMITTER HARDWARE KITS . . . 68P81016E57
"PRIVATE–LINE" DISABLE CABLE KIT . . . 68P81026E77

RECEIVER INTRODUCTION . . . 68P81026E76
RECEIVER INTERCONNECT BOARD . . . 68P81034E07
RECEIVER INTERCONNECT UNIT . . . 68P81026E72
RECEIVER RF & IF BOARD . . . 68P81015E02
RECEIVER AUDIO & SQUELCH BOARD . . . 68P81025E79
AUDIO POWER AMPLIFIER . . . 68P81014E97
"DIGITAL PRIVATE–LINE" DECODER . . . 68P81028E66
"PRIVATE–LINE" DECODER . . . 68P81026E73
RECEIVER SHIELD UNIT . . . 68P81025E14
RF PREAMPLIFIER & CABLE . . . 68P81016E33
2–RECEIVER COUPLER . . . 68P81016E62
RECEIVER HARDWARE KIT . . . 68P81034E24

POWER SUPPLY . . . 68P81033E41
POWER SUPPLY . . . 68P81020E44

SCHEMATIC DIAGRAM AND ALIGNMENT PROCEDURE . . . 68P81103E49
RF INTERCABLING SECTION (INTERMITTENT DUTY STATIONS) . . . 68P81016E97
RF INTERCABLING SECTION (CONTINUOUS DUTY STATIONS) . . . 68P81016E98
RF INTERCABLING SECTION (CONTINUOUS DUTY STATION WITH UNIFIED CONTROL CHASSIS . . . 68P81034E06

PARTS LIST

TLN5122A Power Supply Board PL-2420-A

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITOR, fixed uF ±10%, 100 V unless otherwise stated
C10	21-848236	650 pF ±5%, 300 V
C11	21-82187B20	.001
C13 thru 16	21-82187B20	.001
C17	23-82601A25	100 -10+150%, 20 V
C19	21-848236	650 pF ±5%, 300 V
C20	21-82187B20	.001
C22 thru 25	21-82187B20	.001
C26	23-83210A19	500 -10+100%, 20 V
		SEMICONDUCTOR DEVICE, diode (SEE NOTE)
CR5 thru 10	48-83654H01	Silicon
		TRANSISTOR (SEE NOTE)
Q1	48-869643	PNP, type M9643
Q3	48-869648	NPN, type M9648
Q4	48-869642	NPN; type M9642
Q5	48-869643	PNP, type M9643
Q7	48-869706	NPN, type M9706
Q8	48-869594	NPN type M9594
		RESISTOR, fixed ±10%, 1/4 W unless otherwise stated
R3	6-10401C49	1k
R4	6-10401C61	3.3k
R5	6-10401C19	56
R6	6-488022	10 1 W
R7	6-10401C29	150
R8	6-10401A35	270 ±5%
R9	6-10401A61	3.3k ±5%
R10	6-10401C49	1k
R11	6-10401C61	3.3k
R12	6-10401C19	56
R13	6-488022	10 1 W
R14	6-10401C29	150
R15	6-10401A33	220 ±5%
R16	6-10401A61	3.3k ±5%
		SEMICONDUCTOR DEVICE, (SEE NOTE)
VR1	48-82256C08	Zener, 8.2 V
VR2	48-82256C25	Zener, 12 V
NON-REFERENCED ITEM		
	42-82690A01	CLIP, fuse; 4 req'd.

TKN6658A Cable Kit PL-2421-A

P2	9-84151B01 14-84590B01 42-10217A02	CONTACT, receptacle; 5 req'd. INSULATOR, connector STRAP, cable; 6 req'd.

NOTE:
For optimum performance, diode and transistor replacement parts must be ordered by Motorola part number only.

TLN5123B Chassis and Hardware Kit (P/O TPN1110B)
TLN5123A Chassis and Hardware Kit (P/O TPN1110A) PL-2417-E

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		CAPACITOR, fixed uF ±10%, 100 V unless otherwise stated
C1	8-84717G01	6, 660 V
C2 thru 9	23-83093G20	17,500 +150-10%, 20 V
C12	21-82187B14	.001
C18	23-82304B16	5000 -10+150%; 35 V
C21	21-82187B14	.001
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR1, 2	1-80739B57	Assembly, silicon
CR3, 4	48-82525G13	silicon
		FUSE, cartridge
F1	65-138179	10 A, 125 V
F2, 3	65-61688	4A, 250 V
		CONNECTOR, receptacle
J1	9-83238C01	3 prong
		CHOKE, filter
L1, 2	25-84514G01	250 uh
		TRANSISTOR (SEE NOTE)
Q2	48-869627	NPN; type M9627
Q6	48-869627	NPN; type M9627
		RESISTOR, fixed
R1, 2	17-83389G02	30 ±5%, 20 W
		TRANSFORMER, power
T1	25-84516G01	primary windings 1 & 2; 3 secondary windings 3 & 5 with 4 center top, 6 & 8 with 7 center top, and 9 & 10
NON-REFERENCED ITEMS		
	14-865854	INSULATOR, transistor; 2 req'd
	5-84512G01	GROMMET, 4 req'd.
	9-82083C01	FUSEHOLDER, extractor post type
	14-84548A01	INSULATOR, diode; 2 req'd.
	37-107234	GROMMET, rubber
	9-84935D01	SOCKET, transistor; 2 req'd.
	64-83562D01	HEAT SINK; 2 req'd.
	30-83211C01	AC LINE CORD, includes molded plug (P1)
	14-82975K01	INSULATOR

REVISIONS

68P81020E44-K

CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
TLN5122A-1	Q7	FROM 48-869648, M9648 TO 48-869706, M9706	13.6 V SERIES REGULATOR
	Q8	FROM 48-869642, M9642 TO 48-869594, M9594	

DESCRIPTION 68P81017E23
INSTALLATION 68P81015E19
UPRIGHT OUTDOOR CABINET 68P81033E42
"COMPA–STATION" OUTDOOR CABINET 68P81033E46
MAINTENANCE 68P81017E24
ANTENNA SWITCH & MISCELLANEOUS HARDWARE 68P81014E92
FILTERS AND DUPLEXERS 68P81102E85
METERING AND INTERCOM 68P81033E28
STATION HARDWARE KIT 68P81033E23

TRANSMITTER INTERCONNECT BOARD 68P81033E78
TRANSMITTER INTRODUCTION 68P81016E64
TRANSMITTER INTERCONNECT UNIT 68P81026E69
EXCITER 68P81026E66
90/100/110 WATT POWER AMPLIFIER 68P81026E67
60 WATT POWER AMPLIFIER 68P81015E12
POWER CONTROL BOARD 68P81015E07
SIMPLEX "DIGITAL PRIVATE–LINE" ENCODER 68P81028E63
DUPLEX "DIGITAL PRIVATE–LINE" ENCODER 68P81028E64
"PRIVATE–LINE" ENCODER 68P81026E71
TRANSMITTER SHIELD UNIT 68P81015E21
TRANSMITTER HARDWARE KITS 68P81016E57
"PRIVATE–LINE" DISABLE CABLE KIT 68P81026E77

RECEIVER INTRODUCTION 68P81026E76
RECEIVER INTERCONNECT BOARD 68P81034E07
RECEIVER INTERCONNECT UNIT 68P81026E72
RECEIVER RF & IF BOARD 68P81015E02
RECEIVER AUDIO & SQUELCH BOARD 68P81025E79
AUDIO POWER AMPLIFIER 68P81014E97
"DIGITAL PRIVATE–LINE" DECODER 68P81028E66
"PRIVATE–LINE" DECODER 68P81026E73
RECEIVER SHIELD UNIT 68P81025E14
RF PREAMPLIFIER & CABLE 68P81016E33
2–RECEIVER COUPLER 68P81016E62
RECEIVER HARDWARE KIT 68P81034E24

POWER SUPPLY 68P81033E41
POWER SUPPLY 68P81020E44

SCHEMATIC DIAGRAM AND ALIGNMENT PROCEDURE 68P81103E49
RF INTERCABLING SECTION (INTERMITTENT DUTY STATIONS) 68P81016E97
RF INTERCABLING SECTION (CONTINUOUS DUTY STATIONS) 68P81016E98
RF INTERCABLING SECTION (CONTINUOUS DUTY STATION WITH
UNIFIED CONTROL CHASSIS 68P81034E06

STEP	A
1	
2	L L
3	L

NOTE

Aligment may be performed using a Motorola S1056B thru S1059B Portable Test Set or optional built-in-station metering. The OSC. & METER REV. SWITCH columns refer to portable test set usage -- polarity is automatically reversed as required when built-in-station metering is used.

EPS-8311-A

STEP	A
1	L L
2	L
3	L L
4	L L L L L L
5	L L L
6	L L
7	L L L L L

THIS SERVICE SHEET SHOWS INFORMATION PERTAINING TO THE CURRENT PRODUCTION MODELS. FOR SERVICING INFORMATION CONCERNING EARLIER EQUIPMENT MODELS AND FOR PARTS REPLACEMENT INFORMATION, REFER TO THE PERTINENT SECTION WITHIN YOUR INSTRUCTION MANUAL.

NEPS-15836-O

THIS SERVICE INFORMATION IS FOR THE USE OF QUALIFIED SERVICE PERSONNEL ONLY

SERVICE SHEET

MOTOROLA

"MICOR"® "COMPA-STATION"®
132-174 MHz BASE RADIO

INTERMITTENT DUTY MODEL SERIES

C53RTB – 60 WATT
C63RTB – 90 WATT
C73RTB – 110 WATT

CONTINUOUS DUTY MODEL SERIES

C53RCB – 60 WATT
C63RCB – 90 WATT
C73RCB – 100 WATT

SERVICE PUBLICATIONS
1301 E. ALGONQUIN ROAD
SCHAUMBURG, ILLINOIS 60196

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Printed in U.S.A.
11/6/78

PEPS-8390-C

TRANSMITTER ALIGNMENT PROCEDURE

(SEE "EXCERPTS FROM FCC REGULATIONS" ON THIS SHEET)

ALL MODELS

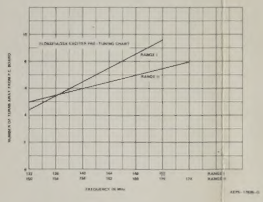
STEP	ADJUST	METERING PLUG LOCATION	SELECTOR SWITCH POSITION	METER REV. SWITCH AND REF A-B SWITCH (SEE NOTE)	STAGE AND PROCEDURE
1					SET UP - Key the transmitter with the XMTR ON pushbutton on the portable test set.
2	POWER SET				OUTPUT - Turn the POWER SET control fully counterclockwise. Unkey the transmitter.
3	FREQUENCY SWITCH	EXCITER	2	OFF REF A	CHANNEL ELEMENT - Select the desired frequency on multi-frequency stations. Key the transmitter. The test set meter 2 should indicate at least 10 uA.
4	ALL EXCITER COILS	EXCITER	5	OFF REF A	PRE-ALIGNMENT - If the exciter is completely untuned and shows no meter 5 readings, set cores of tuning coils L401 to L406 to the top of their coil forms (away from circuit board). Set cores of L407 and L408 per the exciter pre-tuning chart. If a meter 5 reading is available proceed to step 7.
5	L401	EXCITER	2	OFF REF A	BUFFER OUTPUT - Tune L401 for minimum meter reading.
6	L401, L402	EXCITER	3	OFF REF A	BUFFER OUTPUT - Tune L402 and then L401 for peak meter reading.
7	L403	EXCITER	3	OFF REF A	TRIPLER OUTPUT - Tune L403 for minimum meter reading.
8	L403, L404	EXCITER	4	OFF REF A	TRIPLER OUTPUT - Tune L404 and then L403 for peak meter reading.
9	L405	EXCITER	4	OFF REF A	FIRST DOUBLER OUTPUT - Tune L405 for minimum meter reading.
10	L405, L406	EXCITER	5	OFF REF A	SECOND DOUBLER OUTPUT - Tune L406, and then L405 for peak meter reading.
11	L407, L408	EXCITER	5	OFF REF A	EXCITER OUTPUT - Tune L407 then L408 for a peak meter reading.
12	L407, L408	PA	1	METER REV REF A	EXCITER OUTPUT - Move the metering plug to the PA. Tune L408 and then L407 for peak meter reading.
13					Repeat steps 6, 8 and 10.
14					Align the power amplifier.
ALL MODELS EXCEPT 60-WATT MODELS					
15					For complete power amplifier tune-up, proceed with Step 16. To check alignment move metering plug to power control board and go to Step 19.
16	C501, 502				PA PRE-ALIGNMENT - Set C501 fully clockwise and C502 to maximum capacity (plates fully meshed).
17	POWER SET	POWER CONTROL BOARD	Wattmeter or 1 and Meter 5	METER REV. REF A	OUTPUT - Move the metering plug to the power control board. Without exceeding rated power output of 90, 100 or 110 Watts on the wattmeter or calibration label value on meter 1, adjust the POWER SET control for rated power or until no further increase in power output is observed. If meter 5 reads 15-25 uA, go to step 5. If meter 5 reads above 25 uA then adjust the POWER SET control counterclockwise until meter 5 is between 15-25 uA.
18	C501, C502	POWER CONTROL BOARD	5	METER REV. REF B	PA DRIVER OUTPUT - Tune C501, then C502 for a minimum meter 5 reading.
19	POWER SET	POWER CONTROL BOARD	Wattmeter or 1	METER REV. REF A	OUTPUT - Adjust the POWER SET Control for rated power output and repeat step 18. (If rated power cannot be attained, repeat steps 17 and 18.)
			5	METER REV. REF B	Check meter 5 reading, it must not exceed 50 uA.
20		PA	5	METER REV. REF B	FINAL COLLECTOR CURRENT - Move the metering plug to the PA. Measure the final collector current (Ic). Ic in amperes is the meter 5 reading (0-50 uA) x 1/2.
21		PA	6	METER REV. REF B	FINAL COLLECTOR VOLTAGE - Measure the final collector voltage (Vc). Vc is the meter 6 reading (0-30 volt scale).
22					Determine final input power (Pin). Pin equals Vc x Ic. Pin should be less than; 180 watts for 90-watt models; 200 watts for 100-watt continuous duty models and 110-watt intermittent duty models.
60-WATT MODELS ONLY					
15					For complete power amplifier tune-up, proceed with step 16. To check alignment, move metering plug to power control board and go to step 20.
16	C501				PA PRE-ALIGNMENT - Set capacitor C501 fully clockwise.
17	POWER SET	POWER CONTROL BOARD C501	5	METER REV. REF B	OUTPUT - Move metering plug to the power control board. Gradually rotate the POWER SET control until an initial meter 5 reading is observed. Do not readjust POWER SET control. If this indication is less than 50 uA (full scale), proceed with step 18. If this indication is greater than 50 uA, tune C501 for an on-scale reading.
18	POWER SET	POWER CONTROL BOARD	Wattmeter or 1 & 5	METER REV. REF A	OUTPUT - Without exceeding rated power output of 60 watts on wattmeter or calibration label value on meter 1, adjust the POWER SET control for rated power or until no further increase in power output is observed. If PA Meter 5 is greater than 25 uA, adjust POWER SET counterclockwise (if less than 15 uA, adjust POWER SET clockwise) until meter reading is between 15 and 25 uA.
19	C501	POWER CONTROL BOARD	5	METER REV. REF B	PA DRIVER OUTPUT - Tune C501 for minimum meter 5 reading.
20	POWER SET	POWER CONTROL BOARD	Wattmeter or 1	METER REV. REF A	OUTPUT - Adjust the POWER SET control for rated power output and repeat step 19 (if rated power cannot be attained, repeat steps 18 and 19).
			5	METER REV. REF B	Check meter 5 reading, it must not exceed 50 uA.
21		PA	5	METER REV. REF B	FINAL COLLECTOR CURRENT - Move the metering plug to the PA. Measure the final collector current (Ic). Ic in amperes is the meter 5 reading (0-50 uA) x 1/5.
22		PA	6	METER REV. REF B	FINAL COLLECTOR VOLTAGE - Measure the final collector voltage (Vc). Vc is the meter 6 reading (0-30 volt scale).
23					Determine final input power (Pin). Pin equals Vc x Ic. Pin should be less than 120 watts.

EPS-8310-B

OSCILLATOR FREQUENCY ADJUSTMENT

1. Set up test equipment to measure transmitter frequency.
2. Key the transmitter with no modulation. Key the transmitter with the XMTR ON pushbutton on the portable test set rather than with the microphone. On "Private-Line" stations, unplug the "Vibrasender" resonant reed from the PL tone generator.
3. Adjust the channel element warp capacitor for the selected channel to the exact desired frequency. On single-frequency models, adjust the F1 channel element warp capacitor. On multi-frequency models, adjust the warp capacitor which corresponds to the frequency selector switch setting; repeat for each frequency.

EPS-8308-A



"IDC" ADJUSTMENT PROCEDURE

1. Set up test equipment to measure transmitter deviation.
2. Connect the audio oscillator to the portable test set.
3. Set the audio oscillator to 1000 Hz and 1 volt. On "Private-Line" models, replace the "Vibrasender" resonant reed.
4. Key the transmitter and adjust the IDC control for ±5 kHz deviation.
5. Reduce the tone oscillator output to .25 volt. Essentially full deviation should still be indicated.

EPS-8309-A

FREQUENCY CALCULATIONS

Where:

f_o = channel element frequency

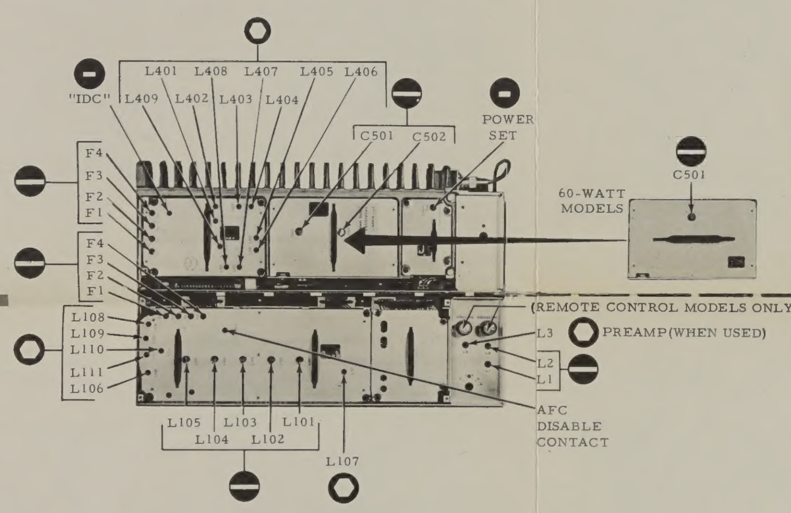
f_c = carrier frequency

$$f_o = \frac{f_c}{12} \qquad f_c = 12\, f_o$$

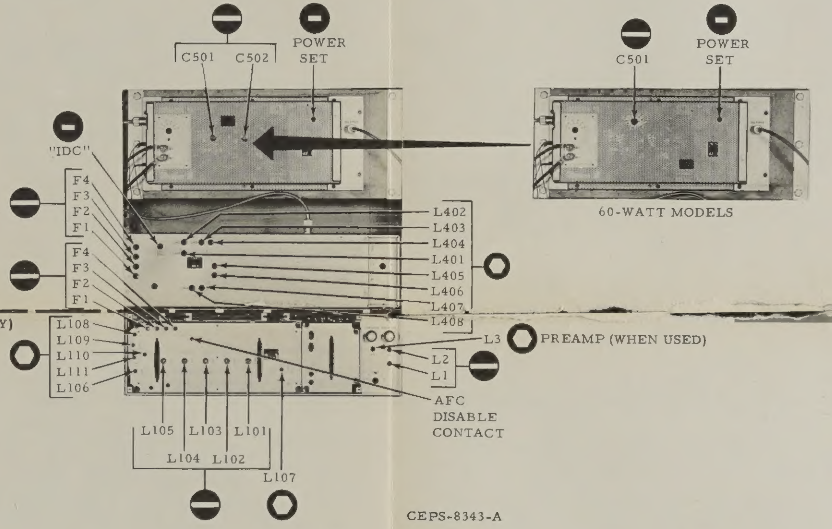
EPS-7257-O

TRANSMITTER ADJUSTMENTS

INTERMITTENT DUTY STATIONS



CONTINUOUS DUTY STATIONS
(REMOTE CONTROL MODELS ONLY)



CEPS-8343-A

EXCERPTS FROM FCC REGULATIONS

FCC Regulations state that:

1. Radio transmitters may be tuned or adjusted only by persons holding a first or second class commercial radiotelephone operator's license or by personnel working directly under their immediate supervision.
2. The power input to the final radio frequency stage shall not exceed the maximum figure specified on the current station authorization. This power input shall be measured and the results recorded:
   a. When the transmitter is initially installed.
   b. When any change is made in the transmitter which may increase the power input.
   c. At intervals not to exceed one year.
3. Frequency and deviation of a transmitter must be checked:
   a. When it is initially installed.
   b. When any change is made in the transmitter which may affect the carrier frequency or modulation characteristics.
   c. At intervals not to exceed one year.

EPS-7254-O

RF PREAMPLIFIER ALIGNMENT

STEP	ADJUST	SELECTOR SWITCH POSITION	OSC. & METER REV. SWITCH	PROCEDURE
1				If the station is equipped with an optional preamplifier, disconnect and bypass the preamplifier. Align the receiver, then reconnect the preamplifier.
2	L3, L2, L1	5	METER REV.	Adjust L3, L2, and L1 in that order for maximum test set meter indication. Repeat.
3	L2			Tune L2 for maximum quieting.

EPS-8303-O

RECEIVER ALIGNMENT PROCEDURE

STEP	ADJUST	SELECTOR SWITCH POSITION	OSC. & METER REV. SWITCH (SEE NOTE)	STAGE AND PROCEDURE
1	L108, L109	3	METER REV.	CHANNEL ELEMENT OUTPUT (3RD HARMONIC) - Adjust L108 and L109 for maximum test set meter indication. On multi-frequency receivers make this adjustment with frequency selector switch in F1 position.
2	L107	11 4	A or B (Test Set must be equipped with 11.7 MHz crystal in corresponding socket) (and with an 11.8 MHz crystal in corresponding socket for some two-receiver stations).	DISCRIMINATOR - Unsquelch the receiver by turning the squelch control fully counterclockwise. "Private-Line" stations must also be PL disabled. Note test set meter indication in position 11 (multiplier switch in 2 V ac position). Insert 11.7 MHz (or 11.8 MHz) injection probe of test set into L106 opening of receiver shield being careful not to contact circuit board. Insert probe into hole far enough to obtain reading 1/10 of that noted at beginning of this step (signal is "sprayed" into receiver). Adjust L107 for 0 center reading on top scale with selector switch of test set in position 4. Adjustment is critical and should be exactly on 0. Remove probe.
3	L110, L111	5	METER REV.	MULTIPLIER - Connect signal generator to antenna input and apply a carrier frequency signal. Adjust L110 and L111 for maximum meter indication. If two peaks are observed, use peak with slugs farthest from circuit board. If a meter 5 indication cannot be obtained, connect center conductor of signal generator cable directly to the mixer gate.
4	L101, L102, L103, L104, L105, L106	5	METER REV.	RF PRESELECTOR AND MIXER - Turn out L101 thru L105 slugs until tip of each tuning screw extends approx. 1/4 inch beyond spring (mechanical parts list code 8). Connect signal generator to antenna input and apply carrier frequency signal. Tune L101 thru L105 for peak on meter position 5. Turn L103, L104, and L105 slugs in one turn. Peak L106 thru L101, in that order, on meter position 5. Decrease signal generator output as necessary to maintain indication between 10 and 25 uA.
5	L108, L110, L111	5	METER REV.	Adjust signal generator output for 25 uA meter indication. Detune L108 until meter indication decreases to 15 uA. Repeak L110 and L111 for maximum meter indication. Repeat entire step.
6	L108, L109	3	METER REV.	Repeak L108 and L109 for maximum meter indication.
7	L101, L102, L103, L104, L105	5 11	METER REV. OFF	Repeak L101 through L105 for maximum meter indication. Repeat. Peak L103 thru L105 for minimum indication on meter 11 (maximum quieting).
8	F1, F2, F3, F4	5 4	METER REV.	ON-FREQUENCY ADJUSTMENT - Disconnect signal generator and transmit carrier signal from transmitter normally received. If transmitter is known to be on frequency test set meter position 5 should indicate rise when transmitter is keyed (if necessary connect antenna). Check test set position 4 reading with transmitter keyed. 0 indicates on-frequency condition. Adjust F1, F2, F3 & F4 receiver warp capacitors for exact 0 reading in corresponding frequency selector switch positions. DO NOT READJUST L108 OR L109 AFTER THESE ADJUSTMENTS ARE MADE. If the receiver is equipped with AFC, short the AFC DISABLE contact while adjusting F1, F2, F3 and F4.
9	-	-	-	Perform 20 dB quieting sensitivity measurement as check of alignment.

EPS-8304-O

RECEIVER ADJUSTMENTS

TWO-RECEIVER STATIONS

The Two Receiver Coupler used to connect both receivers to an antenna does not require alignment. Align both receivers while disconnected from the Two Receiver Coupler. Inject signal generator output into each receiver at the rf preselector (or preamp) and align. Then reconnect the Two Receiver Coupler and check for proper connections.

EPS-8305-O

FREQUENCY CALCULATIONS

Where:

f_o = channel element frequency

f_c = carrier frequency

11.7 MHz IF Receivers	11.8 MHz IF Receivers
132-150.8 MHz	
$f_o = \dfrac{f_c + 11.7\text{ MHz}}{9}$	$f_o = \dfrac{f_c + 11.8\text{ MHz}}{9}$
150.8-174 MHz	
$f_o = \dfrac{f_c - 11.7\text{ MHz}}{9}$	$f_o = \dfrac{f_c - 11.8\text{ MHz}}{9}$

EPS-8306-O

20 DB QUIETING SENSITIVITY CHECK

USING BUILT-IN STATION METERING

1. Unsquelch the receiver by turning the SQUELCH control fully counterclockwise. "Private-Line" stations must also be PL disabled.
2. Set the range switch on an ac voltmeter to the 2 V ac position and connect the voltmeter across the speaker terminals of the built-in-station meter kit. Adjust the station VOLUME control for 2 volts as indicated on the voltmeter.
3. Connect a signal generator to the station antenna receptacle and adjust it to the receiver frequency. Set the rf output to minimum.
4. Increase the signal generator output until the meter reading drops to .2 volt. The generator output level now indicates the 20 dB quieting sensitivity and should be 0.5 microvolt, or less (0.25 microvolt, or less, with preamplifier).

USING PORTABLE TEST SET

1. Unsquelch the receiver by turning the SQUELCH control fully counterclockwise. "Private-Line" stations must also be PL disabled.
2. Connect the red "control" plug of the adapter cable to the control receptacle on the local or remote control board.
3. Set the multiplier switch on the test set in the 2 V ac position.
4. Adjust the VOLUME control until 2 volts is obtained on meter position 11. Set the speaker switch of the test set in the LOAD position to silence the test set speaker during the test.
5. Connect the signal generator to the station antenna receptacle and adjust it to the receiver frequency. Set the rf output to minimum.
6. Increase the signal generator output until the meter reading drops to .2 volt in meter position 11 (place the multiplier switch in the .2 V ac position). The generator output level now indicates the 20 dB quieting sensitivity and should be 0.5 microvolt, or less (0.25 microvolt with preamplifier).

EPS-8307-O

NOTE

Aligment may be performed using a Motorola S1056B thru S1059B Portable Test Set or optional built-in-station metering. The OSC. & METER REV. SWITCH columns refer to portable test set usage -- polarity is automatically reversed as required when built-in-station metering is used.

EPS-8311-A

THIS SERVICE SHEET SHOWS INFORMATION PERTAINING TO THE CURRENT PRODUCTION MODELS. FOR SERVICING INFORMATION CONCERNING EARLIER EQUIPMENT MODELS AND FOR PARTS REPLACEMENT INFORMATION, REFER TO THE PERTINENT SECTION WITHIN YOUR INSTRUCTION MANUAL.

NEPS-15836-O

THIS SERVICE INFORMATION IS FOR THE USE OF QUALIFIED SERVICE PERSONNEL ONLY

SERVICE SHEET

MOTOROLA

"MICOR"® "COMPA-STATION"®
132-174 MHz BASE RADIO

INTERMITTENT DUTY MODEL SERIES	CONTINUOUS DUTY MODEL SERIES
C53RTB – 60 WATT	C53RCB – 60 WATT
C63RTB – 90 WATT	C63RCB – 90 WATT
C73RTB – 110 WATT	C73RCB – 100 WATT

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Printed in U.S.A.
11/6/78

SERVICE PUBLICATIONS
1301 E. ALGONQUIN ROAD
SCHAUMBURG, ILLINOIS 60196

68P81103E49–N

"PL" ENCODER

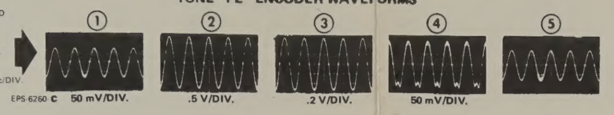
701. ALL AC VOLTAGE MEASUREMENTS ARE RMS VALUES. ALL AC VOLTAGES ARE SINUSOIDAL EXCEPT Q708 EMITTER, METER READING DEPENDENT UPON METER RESPONSE TO NON-SINUSOIDAL WAVE.
702. DC VOLTAGE MEASUREMENTS IN Q705, Q706 & Q707 STAGES TAKEN WITH RESPECT TO A-. VOLTAGES FOR ALL OTHER STAGES TAKEN WITH RESPECT TO CHASSIS GROUND. ALL DC VOLTAGES MAY BE MEASURED WITH 20,000 OHM-PER-VOLT METER OR HIGH IMPEDANCE DC VOLTMETER (11 MEGOHM) EXCEPT BASE OF Q704 WHICH CAN ONLY BE MEASURED WITH A HIGH IMPEDANCE METER.
703. UNLESS OTHERWISE STATED: CAPACITOR VALUES ARE IN PICOFARADS. RESISTOR VALUES ARE IN OHMS.
704. PIN 701 IS USED ONLY FOR CERTAIN OPTIONAL EQUIPMENT.

EPS-7051-A

TONE "PL" ENCODER WAVEFORMS

OSCILLOSCOPE WAVEFORMS MEASURED UNDER FOLLOWING CONDITIONS:

1. WAVEFORMS SHOWN USING 100-Hz "VIBRASENDER" RESONANT REED.
2. VERTICAL SENSITIVITY SHOWN UNDER EACH WAVEFORM.
3. HORIZONTAL DEFLECTION = 5 msec/DIV.
4. ALL WAVEFORMS MEASURED IN RESPECT TO CHASSIS GROUND.

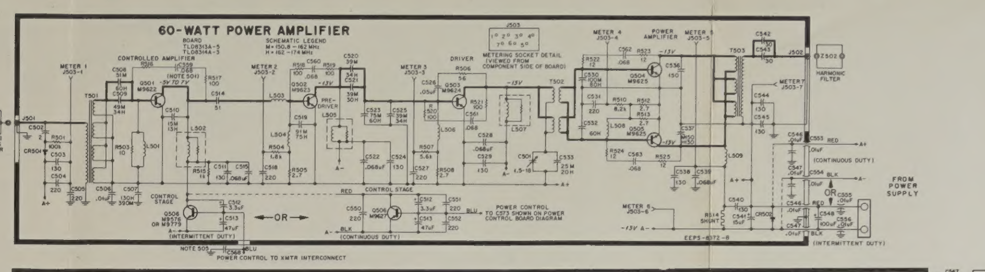


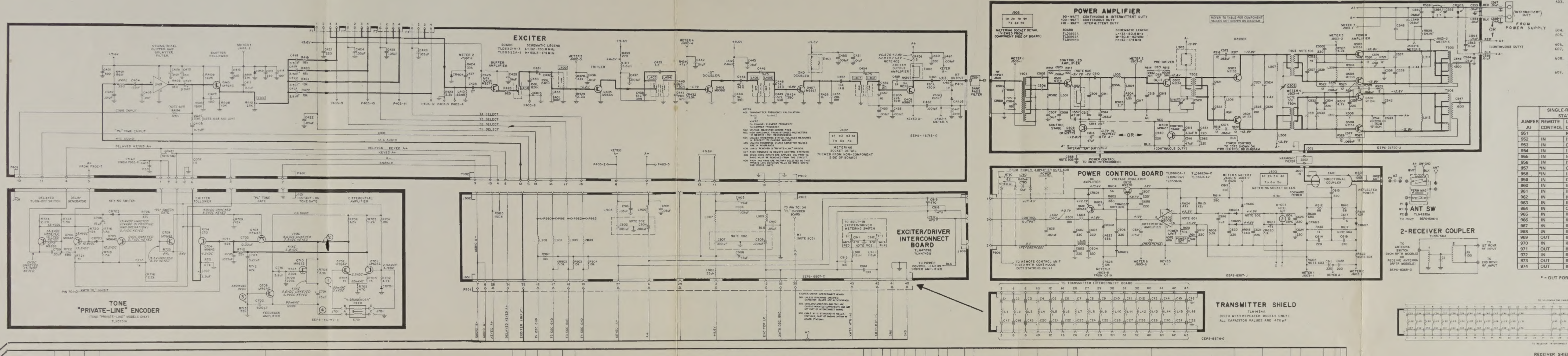
EPS-6260 C

ALL AUDIO CIRCUIT OSCILLOSCOPE WAVEFORMS TAKEN UNDER FOLLOWING CONDITIONS:

1. VERTICAL SENSITIVITY SHOWN UNDER EACH WAVEFORM.
2. HORIZONTAL DEFLECTION = .25 msec/DIV.
3. SQUELCH CONTROL FULLY COUNTERCLOCKWIRE (OFF). 1000 uV RF SIGNAL INPUT MODULATED WITH 1000 Hz TONE WITH 3.0 kHz DEVIATION.
4. VOLUME CONTROL SET FOR 9.0 V rms AT LOAD.
5. OUTPUT TERMINATED IN 8-OHM LOAD.
6. R203 SET FOR 175 mV AT PIN 7 WITH +5 kHz DEVIATION (1 kHz TONE).

EPS-8364-A





POWER AMPLIFIERS

501. VOLTAGES DEPENDENT UPON AMOUNT OF CUTBACK FROM POWER CONTROL BOARD.
502. VOLTAGES MEASURED IN RESPECT TO A+ UNLESS OTHERWISE SPECIFIED.
503. UNLESS OTHERWISE SPECIFIED: CAPACITOR VALUES ARE IN PICOFARADS.
504. THE CONTROL STAGE TRANSISTOR IS BOARD-MOUNTED FOR INTERMITTENT DUTY OPERATION AND CHASSIS-MOUNTED FOR CONTINUOUS DUTY OPERATION.
505. C566 IS PART OF TRANSMITTER CHASSIS & HARDWARE KIT.
506. FOR FREQUENCY RANGE 162-174 MHz AIR-CORE TRANSFORMERS.

EPS-8362-A

POWER CONTROL BOARD

601. VOLTAGES AT PINS 1 AND 5 SHOULD DIFFER BY LESS THAN 50 mV.
602. VOLTAGES MEASURED AT 25 C.
603.

POWER	R606	R622	R617
60 W	15K	18K	1.8K
90/100/110 W	27K	47K	2.2K

604. TYPICAL VOLTAGES UNDER NORMAL OPERATING CONDITIONS.
605. UNLESS OTHERWISE STATED: CAPACITOR VALUES ARE IN PICOFARADS.
606. FACTORY ADJUSTMENT.
607. RT601 OMITTED IN CONTINUOUS DUTY STATIONS AND FOR MODELS TLD8610AV & TLD8620AV.
608. USED ONLY IN CONTINUOUS DUTY STATIONS. NOT PART OF OR MOUNTED ON POWER CONTROL BOARD. PART OF MODEL TLN4780A P.A. HEAT SINK KIT.
609. ON MODEL TLD5960A CR602 IS A HYBRID ASSEMBLY.

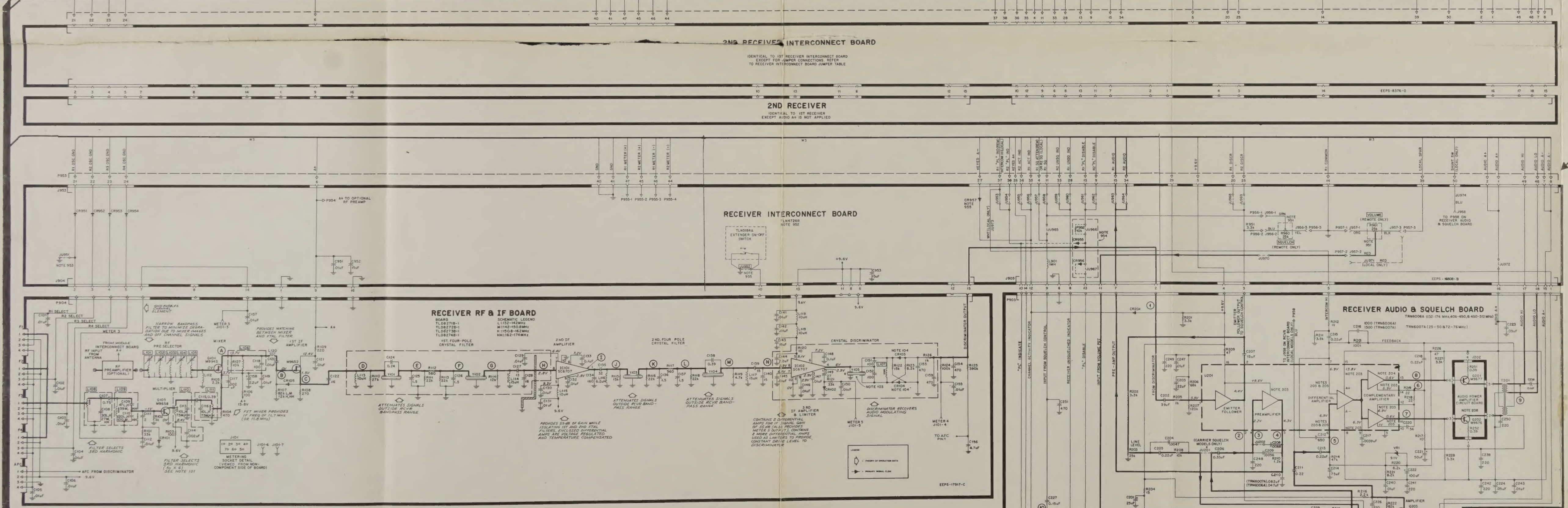
EPS-8313-E

RECEIVER INTERCONNECT BOARD
JUMPER TABLE

JUMPER JU	SINGLE-RECEIVER STATION		TWO-RECEIVER STATION			
			RECEIVER NO. 1		RECEIVER NO. 2	
	REMOTE CONTROL	LOCAL CONTROL	REMOTE CONTROL	LOCAL CONTROL	REMOTE CONTROL	LOCAL CONTROL
951	NOTE 953					
952	IN	IN	IN	IN	IN	IN
953	IN	OUT	IN	OUT	OUT	OUT
954	IN	IN	OUT	IN	IN	OUT
955	IN	IN	OUT	OUT	IN	IN
956	IN	IN	IN	IN	OUT	OUT
957	*IN	OUT	*IN	OUT	OUT	IN
958	*IN	IN	*IN	IN	OUT	OUT
959	IN	OUT	OUT	OUT	IN	IN
960	IN	IN	IN	IN	OUT	OUT
961	IN	IN	IN	IN	IN	IN
962	IN	IN	IN	IN	IN	IN
963	IN	IN	IN	IN	OUT	OUT
964	IN	OUT	OUT	OUT	IN	IN
965	IN	IN	IN	IN	IN	IN
966	IN	IN	IN	IN	IN	IN
967	IN	IN	IN	IN	IN	IN
968	IN	IN	IN	IN	OUT	OUT
969	OUT	IN	OUT	OUT	OUT	IN
970	IN	IN	IN	IN	IN	OUT
971	OUT	IN	OUT	IN	OUT	IN
972	IN	IN	IN	IN	OUT	OUT
973	OUT	IN	OUT	IN	OUT	OUT
974	OUT	IN	OUT	IN	OUT	IN

* = OUT FOR REPEATER STATIONS

EPS-8637-A


2ND RECEIVER INTERCONNECT BOARD
2ND RECEIVER
RECEIVER INTERCONNECT BOARD
RECEIVER RF & IF BOARD
RECEIVER AUDIO & SQUELCH BOARD
EEPS-17917-C

DC VOLTAGE TABLE FOR IC'S

IC201				IC202			
PIN	VOLTAGE	PIN	VOLTAGE	PIN	VOLTAGE	PIN	VOLTAGE
1	5.9 V	9	8.3 V NOTE 203	1	4.1 V	9	9.4 V
2	4.4 V	10	1.0 V NOTE 203	2	2.2 V	10	0 V USQ 6.0-9.0 V FSQ
3	0 V	11	0.6 V NOTE 203	3	4.0 V	11	—
4	2.2 V	12	6.9 V NOTE 203	4	0.94 V USQ 1.6 V FSQ	12	0 V USQ 0 V FSQ NOTE 201
5	4.3 V	13	0.6 V NOTE 204	5	0V	13	6.3 V USQ 1.1 V FSQ
6	6.9 V NOTES 203 & 205	14	6.9 V NOTE 203	6	0 V	14	—
7	6.9 V NOTES 203 & 205	15	13.8 V NOTE 203	7	0 V	15	2.2 V
8	A-	16	9.6 V NOTE 203	8	0 V CARRIER SQ. 9.5 V "PL" USQ 0 V "PL" FSQ	16	6.4 V

EPS-6359-B

RECEIVER AUDIO & SQUELCH BOARD

NOTES:
201. +5.6 VOLTS WHEN THRESHOLD SIGNAL JUST OPENS SQUELCH (I.E., APPROXIMATELY 6 dB QUIETING SIGNAL WITH SQUELCH CONTROL AT THRESHOLD).
202. WHERE MORE THAN ONE VOLTAGE READING APPEARS:
USQ = RECEIVER UNSQUELCHED
FSQ = RECEIVER FULLY SQUELCHED
203. VOLTAGE MEASURED WITH RESPECT TO A-.
204. VOLTAGE MEASURED WITH RESPECT TO A+.
205. VOLTAGES AT U201-6 AND -7 MUST BE THE SAME VALUE.
206. UNLESS OTHERWISE STATED: CAPACITOR VALUES ARE IN PICOFARADS.
207. UNLESS OTHERWISE STATED, VOLTAGE MEASUREMENTS ARE FOR DC VOLTAGES ± 10% MEASURED WITH AN 11 MEGOHM INPUT RESISTANCE VOLTMETER WITH RESPECT TO CHASSIS GROUND.
208. AUDIO POWER AMPLIFIER IS NOT PART OF AUDIO & SQUELCH BOARD.
209. JUMPER JU204 MUST BE REMOVED FOR "AND SQUELCH" OPERATION. (SEE "RECEIVER INTERCONNECT UNIT" SECTION). SEE JUMPER TABLE FOR JUMPER USE.

JUMPER TABLE

JUMPER	USE
JU201	CONNECTED IN CARRIER SQUELCH STATIONS
JU202	CONNECTED IN CARRIER SQUELCH STATIONS.
JU203	CONNECTED TO PROVIDE 10 WATTS AUDIO AT SPEAKER WITH LINE LEVELS OF -10 dBM OR LESS (REMOTE CONTROL STATIONS ONLY).
JU204	CUT FOR "AND SQUELCH"

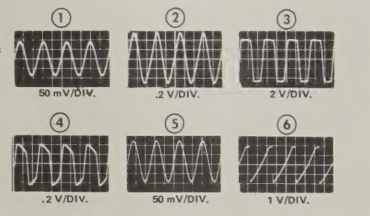
"PL" DECODER

NOTES:
801. DUE TO SQUARE WAVE CHARACTERISTIC SOME METERS RESPOND DIFFERENTLY. VOLTAGE SHOULD BE MEASURED WITH AN OSCILLOSCOPE.
802. AC VOLTAGE READINGS ARE RMS VALUES WITH 60 MILLIVOLTS "PL" TONE INPUT. USE HIGH IMPEDANCE (10 MEGOHM) AC VOLTMETER. MEASUREMENT MADE WITH RESPECT TO CHASSIS GROUND.
803. DC VOLTAGE READINGS TAKEN WITH HIGH IMPEDANCE (11 MEGOHM) DC VOLTMETER. TOP VALUE IS MEASURED WITHOUT "PL" TONE. BOTTOM VALUE IS MEASURED WITH 60 MILLIVOLTS "PL" TONE INPUT. MEASUREMENT MADE WITH RESPECT TO CHASSIS GROUND.
804. UNLESS OTHERWISE STATED: RESISTOR VALUES ARE IN OHMS. CAPACITOR VALUES ARE IN PICOFARADS.
805. JUMPER JU801 AND P801 ARE INCORPORATED IN MODEL TRN6002A ONLY. JU801 IS REMOVED AND P801 IS USED ONLY FOR CERTAIN OPTIONAL EQUIPMENT.

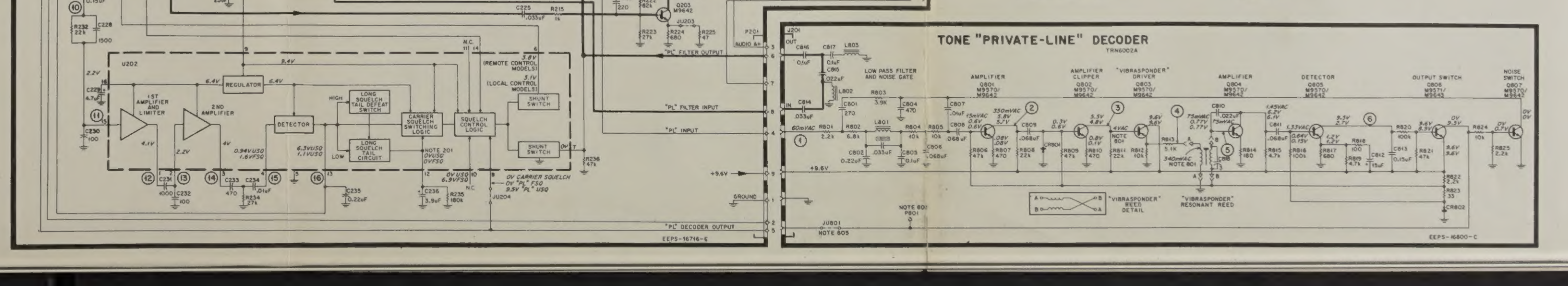
WAVEFORMS MEASURED UNDER FOLLOWING CONDITIONS:

1. VERTICAL SENSITIVITY SHOWN UNDER EACH WAVEFORM.
2. HORIZONTAL DEFLECTION = 5 msec/DIV.
3. WITH RECEIVER OPERATING PROPERLY:
   A. INJECT 1000 uV RF CARRIER AT ANTENNA CONNECTOR.
   B. MODULATE CARRIER WITH "PL" TONE. ADJUST MODULATION FOR WAVEFORM ①; I.E. 60 mV rms (170 mV P-P) AT J201-2.
4. RECEIVER NOT USED:
   A. INJECT "PL" TONE AT J201-2.
   B. ADJUST TONE LEVEL FOR WAVEFORM ①.
5. OSCILLOSCOPE VERTICAL INPUT -- AC.
6. OSCILLOSCOPE SYNC -- INTERNAL.
7. MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND.

"PL" DECODER WAVEFORMS



EPS-6182-B



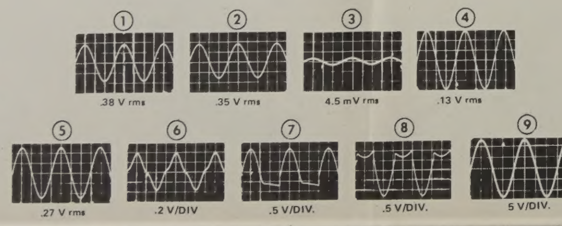
ALL AUDIO CIRCUIT OSCILLOSCOPE WAVEFORMS TAKEN UNDER FOLLOWING CONDITIONS:

1. VERTICAL SENSITIVITY SHOWN UNDER EACH WAVEFORM.
2. HORIZONTAL DEFLECTION = .25 msec/DIV.
3. SQUELCH CONTROL FULLY COUNTERCLOCKWIRE (OFF). 1000 uV RF SIGNAL INPUT MODULATED WITH 1000 Hz TONE WITH 3.0 kHz DEVIATION.
4. VOLUME CONTROL SET FOR 9.0 V rms AT LOAD.
5. OUTPUT TERMINATED IN 8-OHM LOAD.
6. R203 SET FOR 175 mV AT PIN 7 WITH +5 kHz DEVIATION (1 kHz TONE).

EPS-8364-A

50 CONDUCTOR CABLE

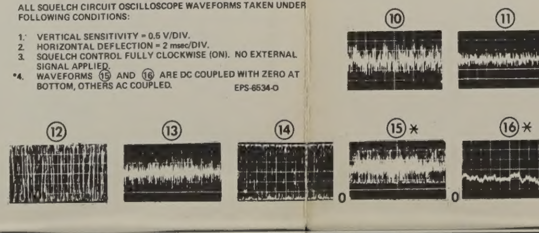
AUDIO CIRCUIT WAVEFORMS



SQUELCH CIRCUIT WAVEFORMS

ALL SQUELCH CIRCUIT OSCILLOSCOPE WAVEFORMS TAKEN UNDER FOLLOWING CONDITIONS:

1. VERTICAL SENSITIVITY = 0.5 V/DIV.
2. HORIZONTAL DEFLECTION = 2 msec/DIV.
3. SQUELCH CONTROL FULLY CLOCKWISE (ON). NO EXTERNAL SIGNAL APPLIED.
*4. WAVEFORMS ⑮ AND ⑯ ARE DC COUPLED WITH ZERO AT BOTTOM, OTHERS AC COUPLED.

EPS-6534-O